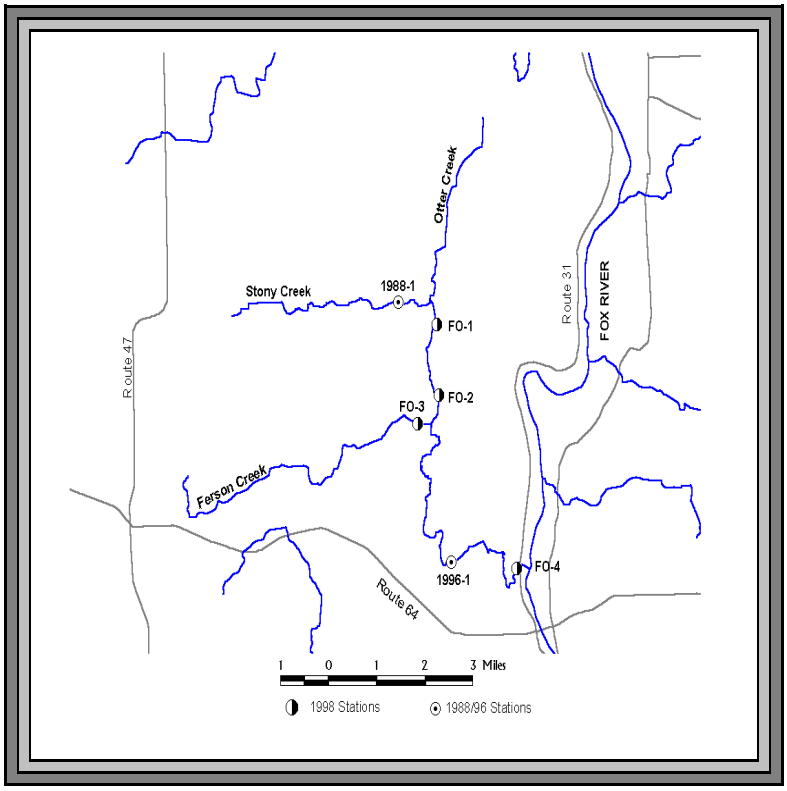
# FERSON/OTTER CREEK BIOLOGICAL SURVEY

Division of Fisheries, September 1998

Ferson Creek is a tributary entering the Fox River near St. Charles, IL. The watershed covers 54 square miles and is located entirely within Kane County. Ferson Creek Park, Ferson Creek Fen, Leroy C. Oakes FP and Otter Creek Bend Wetland are located along Ferson and Otter Creeks.

During 1998, a biological survey of Ferson Creek was conducted to determine the current status of the stream ecosystem. The condition of biological communities can provide clues to existing problems within the stream and the watershed as a whole. In addition to providing useful information for restoration efforts in the watershed, this data will serve as a baseline for evaluating the effectiveness of management practices and will complement stream morphology studies currently underway (St. Charles Park Dist./Chicago Wilderness).




Four locations were selected (see map) on the major branches of Ferson and Otter Creek, representing a range of existing stream habitats. All sites were sampled for fish, macroinverbrates and habitat quality. At each station, stream conditions were evaluated using the Index of Biotic Integrity (IBI), the Macroinvertebrate Biotic Index (MBI), and the Stream Habitat Assessment Procedure (SHAP). The IBI is a widely-used stream quality measurement based on the fish community which takes into account the number and types of species present, their tolerance to degradation, food and habitat preferences and condition. IBI scores range from 12-60, and are the basis for determining a stream segment's Biological Stream Characterization (BSC), a letter rating ranging from A-E. Scores of 51-60 yield the highest rating of 'A', 41-50 yields a 'B' rating, 31-40 IB. points results in a 'C' rating, etc. The MBI is a rating based on the macroinvertebrate sample (bugs and other small critters) used primarily for water quality evaluation. This Index ranges from 0 to 11 with lower scores indicating better quality. SHAP is used to evaluate stream habitat conditions yielding scores ranging from 208 (best) to 16 (worst). Discussion of previous sampling from 1988 and 1996 are also included in this summary.

For all stations combined, 716 fish representing 31 species were collected. Composition of the fish community varied at individual stations primarily in response to differences in habitat and proximity to the Fox River. A summary of conditions at each individual station is given below:

## Station FO-1

Station FO-1 was located just downstream of McDonald Road on Otter Creek. The fish population was dominated by green sunfish, white sucker and bluntnose minnow, all very tolerant species which generally indicate degraded conditions. The habitat at BC-1 rated very poor, with a low SHAP score (53). The MBI (5.0) indicated good water quality conditions. The stream at this location was affected by channelization. The channel was deeply incised, lacking riffle/pool development. Sedimentation was severe due to bank and bed instability. These conditions resulted in a fish community composed of slow water, tolerant species with wide preference of food types (omnivores) yielding an IBI score of 40 out of a possible 60 points.

## Station FO-2

Station FO-2 was located in the Otter Creek Bend Park, downstream of Silver Glen Road. This station had good water quality (MBI=5.2), and habitat in the 'good' range (SHAP=130).

| | FO-1 | FO-2 | FO-3 | FO-4 |
|---|---|---|---|---|
| **# species** | 14 | 14 | 17 | 25 |
| **# intol spp** | 1 | 2 | 5 | 10 |
| **IBI** | 40 | 36 | 50 | 50 |
| **BSC** | C | C | B | B |
| **MBI** | 5.0 | 5.2 | 5.2 | 5.3 |
| **SHAP** | 53 | 130 | 108 | 166 |

However, FO-2 still rated relatively low, with an IBI of 36. The productivity at this station was poor with only 62 fish collected from 14 species. Unlike the stream segment at FO-1, this area of the Otter Creek at FO-2, has not been recently channelized or 'maintained' and retains some good habitat characteristics. However, as indicated by the IBI, this section may suffer from activities elsewhere in the watershed. Upstream channelization and field tiling, together with recent urban development may increase downstream flow rates. The increase in flows has a flushing effect downstream, displacing fish and their food organisms. Channel bed and bank instability could also discourage establishment of

**Central stoneroller *Campostoma anomalum***

biotic communities. Despite the poor IBI, FO-2 shows potential for recovery as indicated by the presence of some good habitat features and several intolerant species.

## Station FO-3

Station FO-3, was located on Ferson Creek about 1/4 mile upstream from the confluence with Otter Creek. This location rated in the 'good' range for both habitat (SHAP=108) and water quality (MBI=5.2) and contained a very diverse fish community for a small stream. A total of 17 species was found, including 5 considered intolerant to degradation. Ferson Creek is a relatively high gradient stream (0.32 % slope; 17 feet/mile), which favors darters and other riffle species (stonecat, northern hogsucker) and reduces vulnerability to sedimentation. The lack of significant channelization and presence of upstream reservoirs may moderate flashy flows reducing the flushing effects at this station. Proximity to the mainstem of Otter/Ferson Creek, which serves as recolonization source, may also be an important factor.

## Station FO-4

Located just 1/4 mile upstream of Fox River, FO-4 had the highest diversity with 25 species, including 6 species of darters. This station had all the components critical to a quality stream segment. Habitat rated in the excellent range (SHAP=166) with very good pool development, offering a wide variety of depths and flows. The lack of channel alteration and the intact corridor and flood plain helps to protect and "feed" this section of the stream with plant debris and woody material. The lower section of the creek is also larger, with more stable conditions, and is able to support a more diverse assemblage of fish. Equally important, is the close proximity to the Fox River which is a rich 'source' population including sport species like smallmouth bass and walleye.

In summary, the condition of biological communities of Ferson /Otter Creek depends on a variety of factors both within the stream and in the watershed as a whole. Based on MBI values, water quality does not appear to be a limiting factor in the stream system. Habitat quality and connection to the Fox River are more important considerations. Instream habitat quality is a function of land use and channel manipulation. Station FO-1 appears to be typical of much of the upper, channelized sections of Otter Creek. The immediate effects of channel straightening are clear with degraded habitat, sedimentation and dominance by tolerant species. Downstream effects of channelization are also apparent, as suggested by conditions at FO-2. Otter Creek, above the confluence with Ferson Creek, appears to have an overall BSC rating of 'C'. In contrast, the natural meandering character of Ferson Creek supports good habitat and a diverse fish population. Results from 1998, combined with a 1996 survey at LeRoy Oakes FP (IBI=48) suggests an overall rating in the upper 'B' range, for Ferson Creek downstream of Compton Lake. A 1988 survey on Stony Creek resulted in an IBI score of 46, indicating that this tributary maintains good habitat features. No smallmouth bass were found upstream of Leroy Oakes FP. A small dam, located just above the Forest Preserve, blocks migration of smallmouth bass and other species from the Fox River. Removal or modification of this and other dams is necessary to reconnect the watershed for full system recovery. Improvement of habitat in upper Otter Creek and moderation of flows is also a critical component.

| COMMON NAME | Otter Ck FO-1 | Otter Ck FO-2 | Ferson Ck FO-3 | Ferson Ck FO-4 | total |
|---|---|---|---|---|---|
| Carp | Five | 0 | 1 | 0 | 6 |
| Creek chub | 5 | 6 | 37 | 0 | 48 |
| Hornyhead chub | 0 | 3 | 21 | 3 | 27 |
| Central stoneroller | 25 | 7 | 40 | 18 | 70 |
| Striped shiner | 2 | 1 | 1 | 0 | 4 |
| Common shiner | 1 | 4 | 1 | 0 | 6 |
| Spotfin shiner | 0 | 0 | 0 | 3 | 3 |
| Fathead minnow | 2 | 1 | 0 | 0 | 3 |
| Bluntnose minnow | 11 | 10 | 18 | 40 | 79 |
| Emerald shiner | 0 | 0 | 0 | 1 | 1 |
| Rosyface shiner | 0 | 0 | 0 | 2 | 2 |
| Sand shiner | 0 | 12 | 0 | 3 | 15 |
| White sucker | 89 | 10 | 29 | 15 | 143 |
| Northern hog sucker | 0 | 1 | 1 | 16 | 18 |
| Golden redhorse | 1 | 0 | 0 | 1 | 2 |
| Channel catfish | 0 | 0 | 0 | 1 | 1 |
| Stonecat | 0 | 1 | 6 | 19 | 26 |
| Tadpole madtom | 0 | 0 | 0 | 2 | 2 |
| Mottled sculpin | 0 | 0 | 0 | 19 | 19 |
| Largemouth bass | 4 | 0 | 9 | 7 | 20 |
| Smallmouth bass | 0 | 0 | 0 | 4 | 4 |
| Green sunfish | 27 | 3 | 45 | 4 | 79 |
| Bluegill | 12 | 1 | 33 | 23 | 69 |
| Walleye | 0 | 0 | 0 | 1 | 1 |
| Blackside darter | 0 | 0 | 0 | 2 | 2 |
| Slenderhead darter | 0 | 0 | 0 | 9 | 9 |
| Logperch | 0 | 0 | 0 | 8 | 8 |
| Johnny darter | 3 | 2 | 3 | 9 | 17 |
| Banded darter | 0 | 0 | 5 | 14 | 19 |
| Rainbow darter | 0 | 0 | 1 | 0 | 1 |
| Fantail darter | 1 | 0 | 5 | 6 | 12 |
| | 168 | 62 | 256 | 230 | 716 |

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CMAP

December 2011

# Ferson-Otter Creek Watershed Plan

December 2011

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This plan was prepared for the Ferson–Otter Creek Watershed Coalition that formed as the plan neared completion. The many contributors to this planning process include Trotter and Associates, Village of South Elgin, Campton Township, Village of Campton Hills, Village of Lily Lake, City of Elgin, City of St. Charles, Kane County Planning, Kane- DuPage Soil and Water Conservation District-Natural Resources Conservation Service, Kane County Health Department, Pizzo and Associates, St. Charles Park District, Lake Campton Property Owners Association, Wildrose Subdivision, The Windings of Ferson Creek HOA, Deer Run Creek HOA, Deer Run East Property Owners Association, Black Creek Hydrology, and the Sierra Club.

# TABLE OF CONTENTS

# 1. INTRODUCTION

## 1.1 WATERSHED PLANNING

Watershed planning is a public process involving local residents, governmental agencies, and other concerned interests. Those participating in the planning process as well as the interests they represent are known as stakeholders since they all have a vested interest, or stake, in the overall health of the place they live or work. Addressing nonpoint-source pollution to protect good water quality or improve poor water quality is the primary purpose for developing a watershed-based plan. Other objectives can be pursued too as they are often related to the health of water resources. The planning process and resultant plan are informed by both local knowledge and science-based information.

The watershed, defined by topography and influential in the movement of surface water, has become the organizing principle for planning and for understanding the interrelationships between the many ways that people view and interact with water resources. When combined with an adaptive management approach to plan implementation, the plan and its stakeholders offer a potentially effective framework for producing and evaluating project and policy recommendations to correct water resource problems.[1] It is through this lens that the Ferson-Otter Creek Watershed Plan was created.

The purpose of the plan that follows is to provide a roadmap for improving local water quality and thus, the quality of life for those that live, work, and play within the Ferson-Otter Creek Watershed. It should be noted that this plan's recommendations are advisory in nature.

## 1.2 HISTORY OF THE WATERSHED

Ferson Creek was named after two brothers, Dean and Reed Ferson, who traveled to the area in 1833 from Vermont to invest in real estate. The brothers laid claim to land that at the time was known as Charleston, present day St. Charles. Dean settled in what is now known as the LeRoy Oakes Forest Preserve before moving to the northwest side of the city near where his brother Reed built a log cabin in the WildRose area.

Stemming from Ferson Creek is Lake Campton, a man-made lake formed from damming Ferson Creek. The idea to create this lake was that of Bill Fisher, an insurance man who developed a number of properties in the Wasco area in the 1950s, which are now part of the Village of Campton Hills. A dam was built on Ferson Creek, just west and south of the intersection of Burlington and Corron Roads to make a private lake and recreation area for boating, fishing and skating. Originally known as Fisher's Lake, this 40 acre body of water has come to be known as Lake Campton.

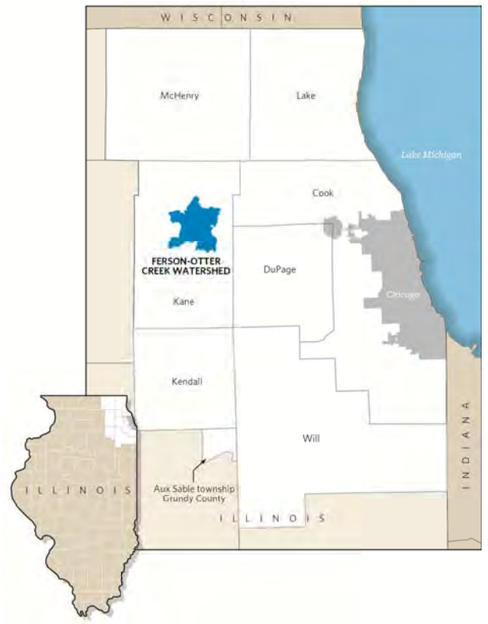
Otter Creek winds throughout land once dedicated to the Henry Sherman and Cyrus Larkin farms. The Creek was surrounded with prairie to the west and woodland to the east. The Cyrus Larkin farm was located where the Elgin Larkin High School now stands today. Henry Sherman was a businessman in addition to being a farmer and Sherman Hospital in Elgin carries his name. He was also part owner of the Elgin Watch factory, which employed women during World War II when the factory converted from making watches to making war materials.

[1] Adaptive management is a natural resource management approach that formulates and implements policies as experiments. If a new policy is found to be successful, hypotheses are confirmed; if policies fail to achieve their objectives, adaptive management learns from the experience and makes informed adjustments accordingly. See, for example, Kai N. Lee. *Compass and Gyroscope: Integrating Science and Politics for the Environment*. Washington, D.C.: Island Press, 2003. Dr. Lee thinks of science and democracy as compass and gyroscope — "navigational aids in the quest for sustainability." Page 6.

## 1.3 OVERVIEW

The Ferson-Otter Creek Watershed is located within the Lower Fox River Basin (Hydrologic Unit Code [HUC] 07120007) and consists of Ferson Creek (HUC 071200070104) and Otter Creek (HUC 071200070103) subwatersheds. For our planning purposes, the two subwatersheds will be studied together as Otter Creek is a tributary to Ferson Creek. The Ferson-Otter Creek Watershed is located on the urban fringe of the Chicago metropolitan area in Kane County, the 5th most populated county in Illinois with a 27.5% population growth from 2000-2010 (Figure 1). The watershed covers portions of the Cities of Elgin and St. Charles as well as the Villages of Campton Hills, South Elgin, and Lily Lake (Figure 2). The total population in Ferson-Otter Creek Watershed is approximately 50,704.[2] The watershed has experienced a 49% increase in population growth since 2000 and has a drainage area of approximately 54 square miles. Additionally, the watershed has a total of 55.1 miles of streams within the watershed.[3] Ferson Creek is 14.6 miles long while Otter Creek is 6.5 miles long.[4] Table 1 breaks down the number of square miles contained within each municipality as well as unincorporated areas.[5] As of 2005, twenty-nine percent of the land area within the watershed was developed.[6]

Figure 1. **Regional location map of Ferson-Otter Creek Watershed**




[2] Bureau of the Census. "2010 Census Summary File 1." *2010 Census*, McHenry County, Illinois. Washington, D.C.: Bureau of the Census, 2011. http://www2.census.gov/census_2010/04-Summary_File_1 (accessed November 3, 2011).
[3] NIPC, U.S. Fish and Wildlife Service and U.S. EPA. *Advanced Identification (ADID) Study, Kane County, Illinois Final Report*. Chicago, IL: USACE Chicago District, August 2004. http://www.lrc.usace.army.mil/co-r/pdf/KaneADIDReport.pdf (accessed November 7, 2011).
[4] IEPA. *Illinois Integrated Water Quality Report and Section 303(d) List - 2010 DRAFT, Volume I: Surface Water*. Springfield, IL: 2010. http://www.epa.state.il.us/water/tmdl/303d-list.html (accessed November 3, 2011).
[5] CMAP. "Municipality Boundaries." Chicago, IL: CMAP, 2009.
[6] "Kane County, Illinois Flood Information," Kane County, Illinois, last modified January 12, 2005, accessed November 7, 2011, http://www.co.kane.il.us/kcstorm/flood/index.htm.

Figure 2. **Municipalities & Townships in Ferson-Otter Creek Watershed**

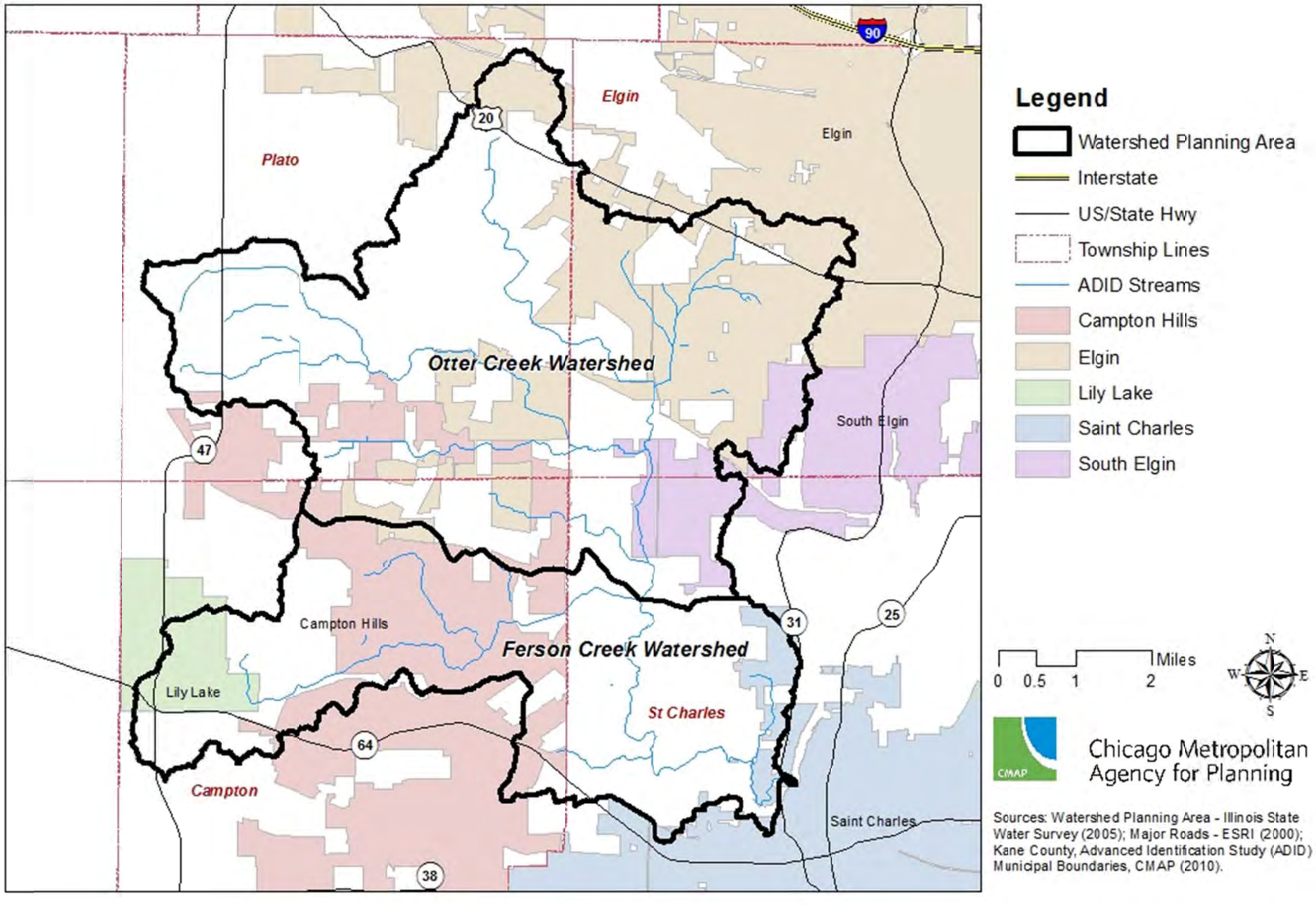


**Table 1. Number of square miles for each municipality within Ferson-Otter Creek Watershed**

| MUNICIPALITY | AREA, IN SQUARE MILES |
|---|---|
| Campton Hills | 8.4 |
| Elgin | 10.3 |
| Lily Lake | 1.4 |
| South Elgin | 2.5 |
| St. Charles | 1.0 |
| Unincorporated Kane County | 30.4 |
| **Total** | **54.0** |

Presently, fecal coliform is the only cause of impairment that has been identified in the watershed.[7] The primary focus of the plan, therefore, will be on recommendations to eliminate this cause to the extent possible. Currently, a lack of comprehensive monitoring data (i.e., spatial resolution) prevents identification of source locations of this contaminant throughout the watershed. Policy recommendations made in the plan regarding fecal coliform will cover a variety of potential sources (septic system failure, wildlife, pet waste, etc.). Similarly the project recommendations will include various projects that will improve overall water quality in addition to having some fecal coliform reduction benefits. The need for more comprehensive monitoring is addressed in Chapter 7.

Additionally the plan will address water quality concerns facing the Fox River given that the Ferson-Otter Creek is a major tributary. To provide context, a brief discussion of the Fox River Basin will be provided in Chapter 2.

In 2010, the Chicago Metropolitan Agency for Planning (CMAP) entered into an agreement with the Illinois Environmental Protection Agency (IEPA)[8] to complete three watershed-based plans within the Fox River Basin, including the Ferson-Otter Creek Watershed. As the delegated authority for the region's areawide water quality management plan, CMAP works with local partners to outline management strategies for eliminating point- and nonpoint-source pollution, protecting groundwater, and managing wastewater throughout the seven-county region.[9] CMAP, as did the Northeastern Illinois Planning Commission before it, uses a collaborative watershed approach to planning that seeks to protect and/or remediate water quality.[10] Funding for these projects was provided by IEPA through Section 604(b) of the Clean Water Act and must meet certain requirements which are discussed below.

## 1.4 PLAN GUIDANCE

The United States Environmental Protection Agency (USEPA) provides guidelines for watershed-based plans produced with Clean Water Act (CWA), Section 319 grant funding aimed at controlling nonpoint-source pollution. Under these guidelines, a watershed-based plan must include at a minimum the following nine components:

1. An identification of the causes and sources that need to be controlled to achieve pollutant load reductions estimated in this plan;
2. An estimate of the load reductions expected for the management measures described under (#3) below;
3. A description of the non-point source management measures that will need to be implemented to achieve the load reductions estimated under (#2) above;
4. An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan;
5. An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented;
6. A schedule for implementing the non-point source management measures identified in this plan;
7. A description of interim, measurable milestones for determining whether non-point source management measures or other control actions are being implemented;
8. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards; and
9. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (#8) above.

Three additional regional criteria listed below are being explored for their utility as well:

1. Set target pollutant-load reductions for impaired waters taking into account both point- and nonpoint-source pollution sources;
2. Consider groundwater protection from both water quality and water quantity perspectives;
3. Compare municipal codes and ordinances against the Center for Watershed Protection's Code and Ordinance Worksheet.[11]

Criterion one is addressed in the Water Quality chapter. The second criterion, groundwater protection, was discussed during stakeholder meetings and covered a variety of topics including groundwater quality, population growth, water supply / demand, and conservation and efficiency. Groundwater protection is especially important in the Ferson-Otter Creek Watershed because all of the communities' public water supplies are dependent on groundwater or river water (Table 2). Lastly the Center for Watershed Protection's Code and Ordinance worksheet provides a starting point to evaluate municipal codes and ordinances to guide relevant plan recommendations discussed in more detail in Chapter 5.

**Table 2. Water source by municipality within the Ferson-Otter Creek Watershed**

| MUNICIPALITY | WATER SOURCE |
|---|---|
| Campton Hills | groundwater |
| Elgin | Fox river[1] |
| Lily Lake | groundwater |
| South Elgin | groundwater |
| St. Charles | groundwater |

1 Elgin relies primarily on the Fox River for their water supply; however, a small portion of their supply is provided by groundwater.

[7] Ferson Creek and Otter Creek were not assessed for all designated uses and potential causes of impairment such as nutrients and other pollutants. Water quality data presented for Ferson Creek were collected at station DTF-01 at its mouth. This station is at Illinois Route 31 in St. Charles in Ferson Creek Park. The soil type at this station is called "Otter silt loam," which is occasionally flooded and has a slope of 0 to 2 percent. For the soil at this station, the hydrological soil group is B and the hydric classification is "all hydric."

[8] "Bureau of Water," IEPA, accessed November 8, 2011, http://www.epa.state.il.us/water/.

[9] NIPC. *Areawide Water Quality Management Plan for Northeastern Illinois*. Chicago, IL: CMAP, 1979.

[10] A watershed planning approach often addresses other related natural resource (e.g. open space, habitat, etc. or built-environment (flooding, stormwater, etc.) management issues in a complementary fashion. In so doing, a watershed plan can be multiobjective.

[11] Center for Watershed Protection. *Managing Stormwater in Your Community: A Guide for Building an Effective Post-Construction Program*. Tool 4: Code and Ordinance Worksheet. Ellicott City, MD: Center for Watershed Protection, 2008. http://www.cwp.org/documents/cat_view/76-stormwater-management-publications/90-managing-stormwater-in-your-community-a-guide-for-building-an-effective-post-construction-program.html (accessed November 8, 2011).

## 1.5 STAKEHOLDER CONCERNS AND GOALS

One of the first tasks for the watershed's diverse set of stakeholders was the discussion and establishment of goals for the Ferson-Otter Creek Watershed Plan. Before developing the goals, stakeholders were asked to communicate their concerns and vision for the watershed. Stakeholder concerns included:

- Fecal coliform, nutrients and sediment and other pollutants.
- Current and future development in the watershed and its effect on stream health.
- Lack of education for land owners along creeks, need to encourage stream corridor best management practices.
- The ecological condition of the lands adjacent to the creek as well as the natural areas throughout the watershed, protecting quality of open space and the need for a healthy stream corridor.
- Stormwater
    - Too much runoff and not enough infiltration and recharge.
    - Non-point source pollution
    - Volume of stormwater channeled into creek leading to stream bank erosion and sedimentation.
- Need for improved recreation and education opportunities on public land in coordination with Kane County.
- Log jams and beaver dams along the creek.
- Tree removal and clearing debris.

Goals were then drafted directly from the concerns expressed by the stakeholders. The final goals were adopted November 23, 2010 and capture the desired outcomes and vision for the watershed. Recommendations throughout the plan will address each of the following goals:

1) Reduce fecal coliform contributions to Ferson and Otter Creek.
2) Reduce nutrients, sediments, and other pollutant contributions to Ferson and Otter Creek.
3) Raise stakeholder (residents, public officials, etc.) awareness about the importance and best management practices of proper watershed stewardship.
4) Promote land use and best management practices that minimize increases in the volume of stormwater runoff and reduce the risk of flood damage.
5) Protect the quality and quantity of our water supplies.
6) Improve the physical condition of our waterways.
7) Develop an effective and lasting Watershed Coalition to foster continuing stewardship efforts in the watershed.

## 1.6 THE PLANNING PROCESS

The Ferson-Otter Creek Watershed planning process was designed to be stakeholder-driven with assistance from CMAP and other partner agencies. As the project lead, CMAP facilitated monthly meetings (between September 2010 and December 2011) and provided technical assistance for the watershed-based plan. The kick-off meeting was held on September 21, 2010 at the Campton Township Community Center in St. Charles, Illinois. In addition to monthly meetings, one evening Open House meeting was held to better accommodate a wider variety of stakeholders. Several "stream walks" were organized in which stakeholders experienced both healthy landscapes within the watershed as well as areas in need of improvement. Together these meetings directed the development of the watershed-based plan based on stakeholder input, best professional judgment, and the requirements enumerated above.

The Conservation Foundation (TCF)[12] and the Fox River Ecosystem Partnership (FREP)[13] are both partners in the planning process and have received grants from CMAP. In coordination with CMAP and FREP, TCF served as the watershed coordinator, convened local stakeholders, and executed an education and outreach campaign during the planning process.
FREP supported the outreach and education effort by upgrading their website (subwatersheds webpage), highlighting watershed planning activity in their monthly e-newsletter – "Downstream" and hosting a Noon Network in the Ferson-Otter Creek Watershed on October 19, 2011.[14]

[12] "The Conservation Foundation," Conservation Foundation, accessed November 8, 2011, http://www.theconservationfoundation.org/. The Conservation Foundation (TCF) was established in 1972 as a not-for-profit land and watershed protection organization. TCF has been involved in planning coordination and technical assistance for a number of watershed plans including Upper DuPage River, Aux Sable Creek, Lower DuPage River, Salt Creek and Tyler Creek.
[13] "Fox River Ecosystem Partnership," FREP, accessed November 8, 2011, http://foxriverecosystem.org/. The Fox River Ecosystem Partnership (FREP) is a not-for-profit created in 1996, comprised of local governments, private businesses, not-for-profits and landowners in the Fox River Basin. FREP's vision for the *Fox River Basin "is to balance all the uses and demands on our natural resources while preserving and enhancing a healthy environment."*
[14] Ibid. 13.

# 2. RESOURCE INVENTORY AND ASSESSMENT

The Resource Inventory and Assessment chapter is a summary of publicly available data that have been gathered for the Ferson-Otter Creek Watershed. The compendium of data and information that follows does not claim to be exhaustive, but rather a good-faith effort at organizing as much as could be collected in a timely manner during the construction of this plan. Data were taken from a variety of sources with the purpose of characterizing the watershed and providing stakeholders with information about existing conditions to assist in the formulation of recommendations for the watershed plan.

## 2.1 FOX RIVER OVERVIEW

This watershed-based plan aims to address the fecal coliform impairment in Ferson Creek; however, the plan can also address some of the Fox River concerns given that the Ferson-Otter Creek is a major tributary. These concerns include nutrients (phosphorus and nitrogen) and sediment or total suspended solids. Sources of these pollutants include both agricultural and urban runoff. To provide context, a brief discussion of the Fox River Basin follows.

The Fox River is the third largest tributary of the Illinois River stretching 185 miles (115 miles in Illinois) from its headwaters near Waukesha, Wisconsin, to its confluence with the Illinois River in Ottawa. The Fox River Basin covers approximately 2,658 square miles of which 1,720 (65%) are in Illinois. The river basin includes portions of eleven Illinois counties including six (Cook, DuPage, Kane, Lake, McHenry, and Will) that are the most populated in the state and six that are among the top ten fastest growing counties in Illinois (#1: Kendall, #2: Will, #3: Grundy, #5: Kane, #7: McHenry, #8: DeKalb)[15]. An attraction for the population growth in the Fox River Basin is the abundance of recreational opportunities and high quality natural resources associated with the river and its tributaries. However, those same high quality resources are being lost or significantly impaired by historic land use change and a type of development that is often inconsistent with sustainable land and water resources stewardship.

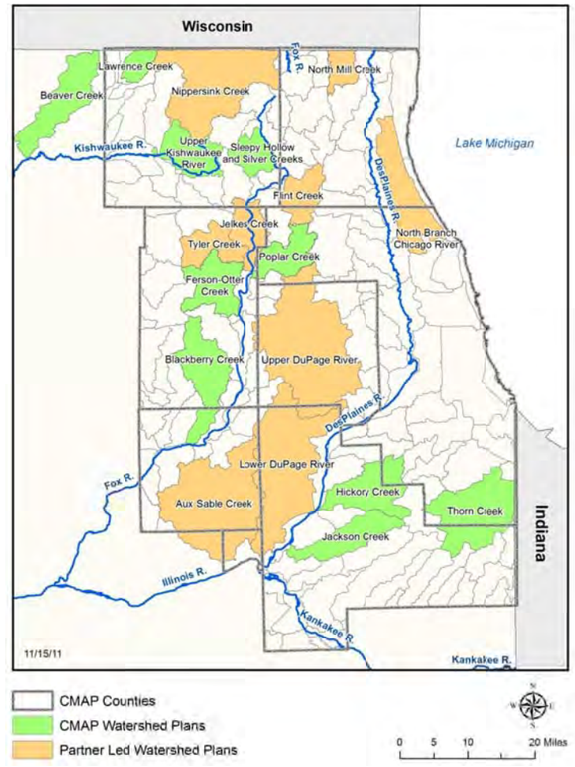
The Illinois portion of the Fox River Basin contains about 2,300 river and tributary stream miles and 406 lakes, many of the lakes glacially formed (IDNR, 1998). Perhaps the most noticeable of these lakes are in the Fox Chain-of-Lakes in northwestern Lake County, comprised of fifteen interconnected lakes with more than 7,500 surface acres of water. Four segments of the Fox River and fourteen glacial lakes are considered to be "biologically significant" with more than 150 state-threatened and endangered species found within the basin (IDNR, 1997).

The map below shows Ferson-Otter Creek's placement within the larger Fox River Basin. The Basin is divided into the Upper and Lower sections with the Lower Fox reaching south into LaSalle County and the Upper Fox River Basin reaching north into Wisconsin. In addition to the Ferson-Otter Creek Watershed Plan, CMAP is simultaneously leading two other watershed planning processes for a total three plans: Sleepy Hollow / Silver Creek in the Upper Fox River Basin and Blackberry Creek along with Ferson-Otter Creek in the Lower Fox River Basin. Figure 3 illustrates where watershed plans exist or are under development within the Fox River Basin, reflecting the need for improving or protecting water quality.

Agricultural and urban development throughout the river basin have had negative impacts on the hydrology, aquatic habitat, and water quality of the Fox River and its tributaries. The invasion of nonnative vegetation has compounded the problem. In many areas the absence of deep rooted native riparian vegetation results in little or no filtering of pollutants and sediment in surface or subsurface runoff from the watershed to the streams.

[15] Bureau of the Census, Population Division. "Population Estimates for the 100 Fastest Growing U.S. Counties in 2003: April 1, 2000 to July 1, 2004." *Population Estimates Program*, Table CO-EST2003-09 (April 14, 2005). http://www.census.gov/popest/counties/CO-EST2004-09.html (accessed November 3, 2011).

Figure 3. **IEPA compliant watershed plans in northeastern Illinois**




The water quality of surface and groundwater resources is assessed throughout the state and is reported in IEPA's biannual *Illinois Integrated Water Quality Report (Report) and Section 303(d) List (List)*[16]. In the 2010 draft *Report*, designated uses listed for the 17 IEPA-identified segments of the Fox River are Aquatic Life, Primary Contact, secondary contact, fish consumption, and/or public water supply. All 17 segments were assessed for Aquatic Life use, with 14 considered nonsupport (impaired) and three segments (one in the Upper Fox, two in the Lower Fox Basin) yielding full support (not impaired). Causes of impairment include sedimentation/siltation, total suspended solids, total phosphorus, pH, certain organics, and unknown causes. Impairment sources include urban runoff/storm sewers, combined sewer overflows, municipal point source discharges, flow regulation/modification, dams/impoundments, agriculture and crop-related sources, habitat modification, bank modification/destabilization, upstream impoundments, recreational pollution, and contaminated sediments.

All 17 segments also were assessed for fish consumption use, and all were considered nonsupport (impaired) due to polychlorinated biphenyls (PCBs) and in some cases also mercury from unknown sources. Of the ten segments assessed for Primary Contact, three were considered full support (not impaired) and the other seven nonsupport (impaired). Causes of Primary Contact impairment were total fecal coliform bacteria from unknown sources. Two segments are used for public water supply, and one was considered full support (not impaired) and the other nonsupport (due to chloride) for that designated use. Per IEPA's *List* (IEPA, 2010a; Appendices A-2 and A-3), the entire Fox River within Illinois and all 10 lakes within the Fox Chain O'Lakes are 303(d)-listed waters. Additionally, 66 of the other 72 lakes that were assessed within the Fox River Basin are 303(d)-listed (for the aesthetic quality and/or fish consumption designated use), including Silver Lake for fish consumption use due to mercury.

[16] IEPA. Illinois Integrated Water Quality Report and Section 303(d) List - 2010 DRAFT, Volume I: Surface Water. Springfield, IL: 2010. http://www.epa.state.il.us/water/tmdl/303d-list.html (accessed November 3, 2011).

## 2.2 PHYSICAL AND CULTURAL CHARACTERISTICS

This section characterizes the physical and cultural aspects of the watershed. The physical conditions of Ferson-Otter Creek directly affect water quality and quantity and provide guidance for recommendations so that they may work *with* not against the natural features of the landscape. The cultural watershed characteristics provide information on the effects of cultural decisions such as land use change that also affect water quality and quantity in the watershed.

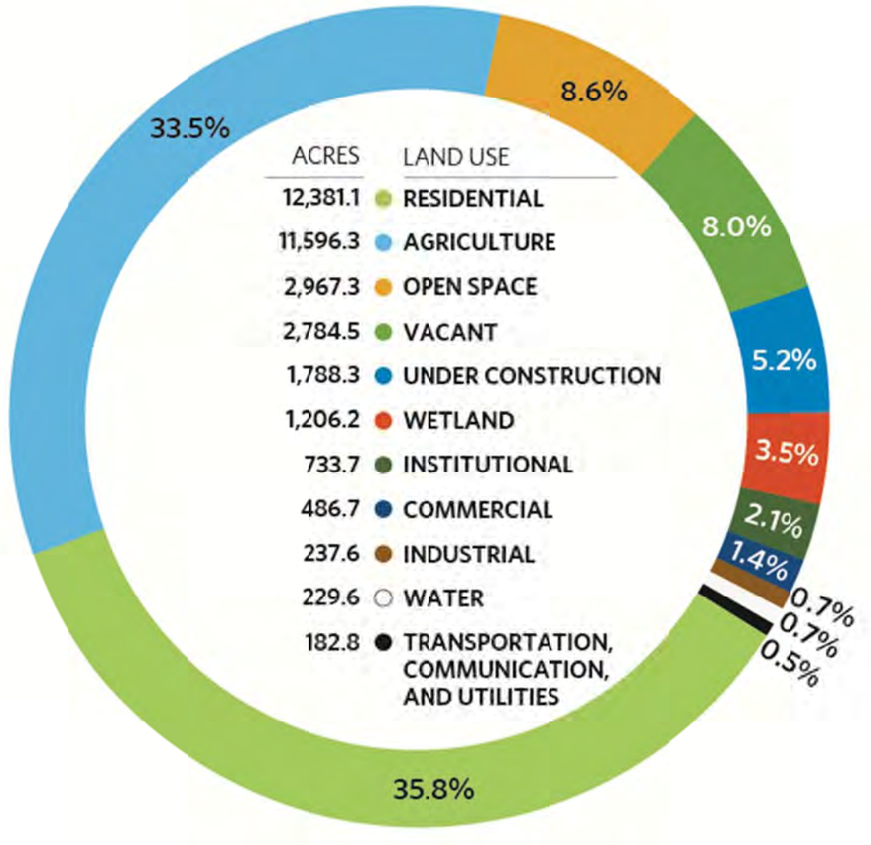
### 2.2.1 Land Use and Pre-settlement Land Cover

Land use refers to the human use of land. Land use decisions have a significant impact on water quality. For example, an intensely developed area features impervious surfaces,[17] reduced natural vegetation, and causes considerable change to local hydrology. Surface runoff from such an area, picks up contaminants and along with the altered hydrologic regime, impacts Aquatic Life in streams and lakes. Such a scenario can also contribute to local or regional flooding. Additionally, impervious surfaces reduce or prevent the natural infiltration of rainwater and snowmelt into the ground and thus, reduce natural groundwater recharge. Land use, therefore, is an important consideration in watershed planning.

A variety of land uses are present in the Ferson-Otter Creek Watershed. Figure 4 shows the land use breakdown by percentage within the watershed with residential use being the most prominent –covering 35.79% of the total watershed, followed by agricultural use with 33.52%.[18] The remaining land uses are all below 10% each. Figure 5 shows land use within the watershed spatially.

For a qualitative sense of historic land use change, Figure 6 shows the pre-settlement land cover as it existed in the early 1800's and is provided by the Illinois Natural History Survey.[19] The watershed was mostly prairie and forest.

Figure 4. **Land use breakdown withiin Ferson-Otter Creek Watershed**




[17] "Water Science for Schools," USGS, last modified February 8, 2011, accessed November 3, 2011, http://ga.water.usgs.gov/edu/impervious.html. Naturally vegetated areas that have been replaced by roads, buildings, housing developments, and parking lots are described as impervious surfaces.
[18] NIPC. Land Use Inventory. Chicago, IL: CMAP, 2005. http://www.cmap.illinois.gov/land-use-inventory (accessed September 14, 2011).
[19] "Land Cover of Illinois in the Early 1800's," Illinois Natural History Survey, accessed October 31, 2011, http://www.inhs.uiuc.edu/resources/gisresources.html.

Figure 5. **Land use in Ferson-Otter Creek Watershed**

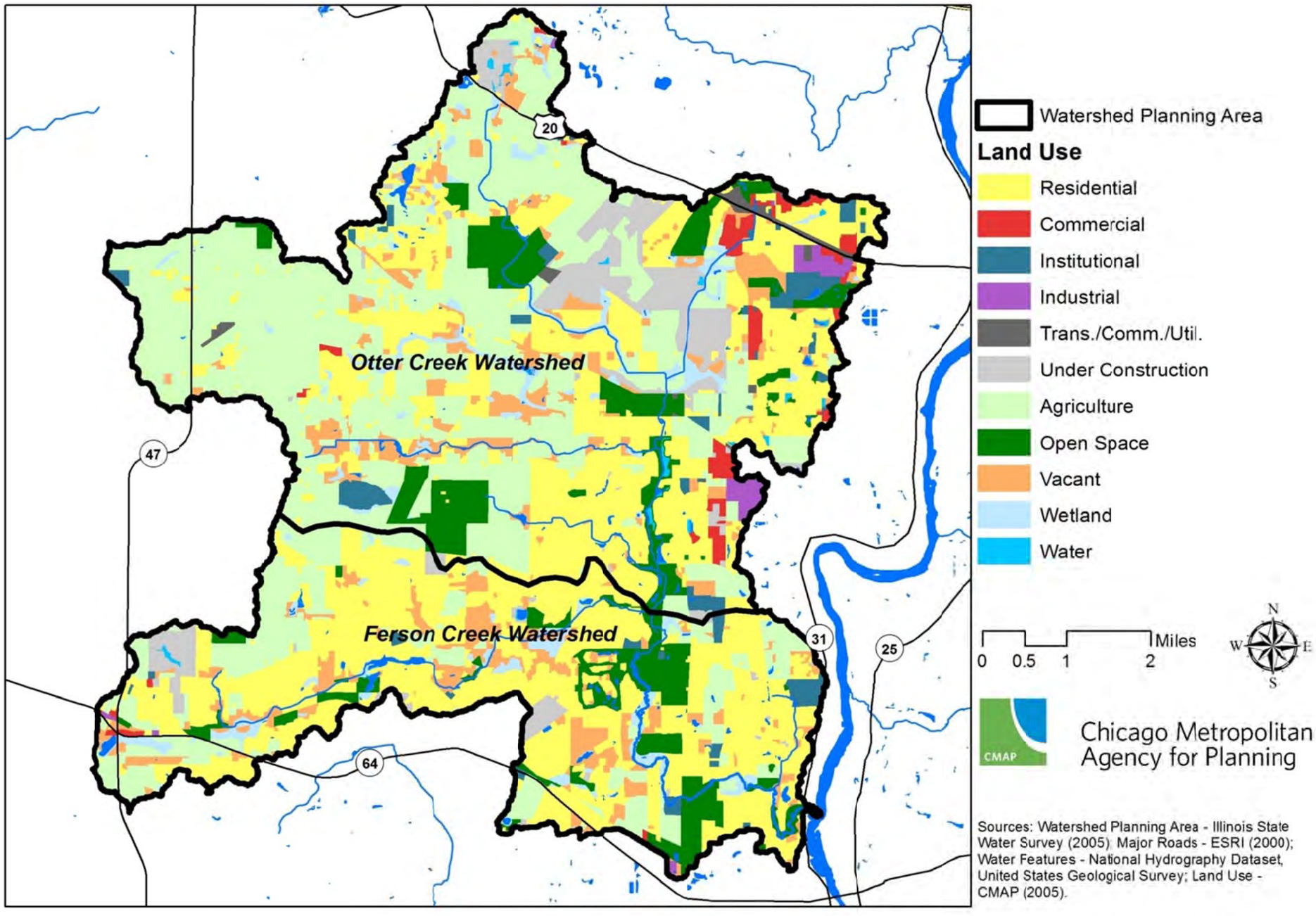
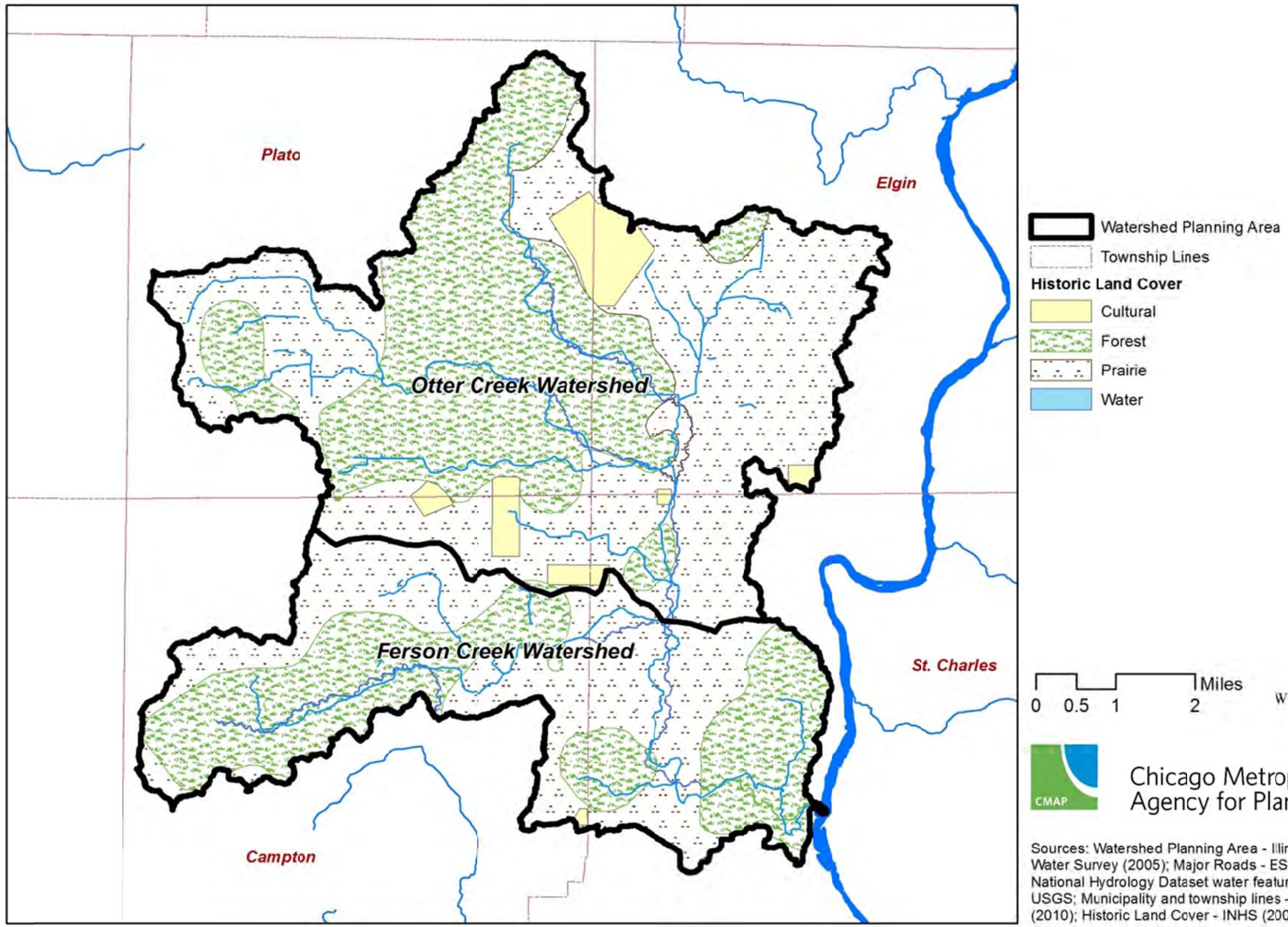


Figure 6. **Pre-settlement land cover for Ferson-Otter Creek Watershed**



### *Impervious Surface*

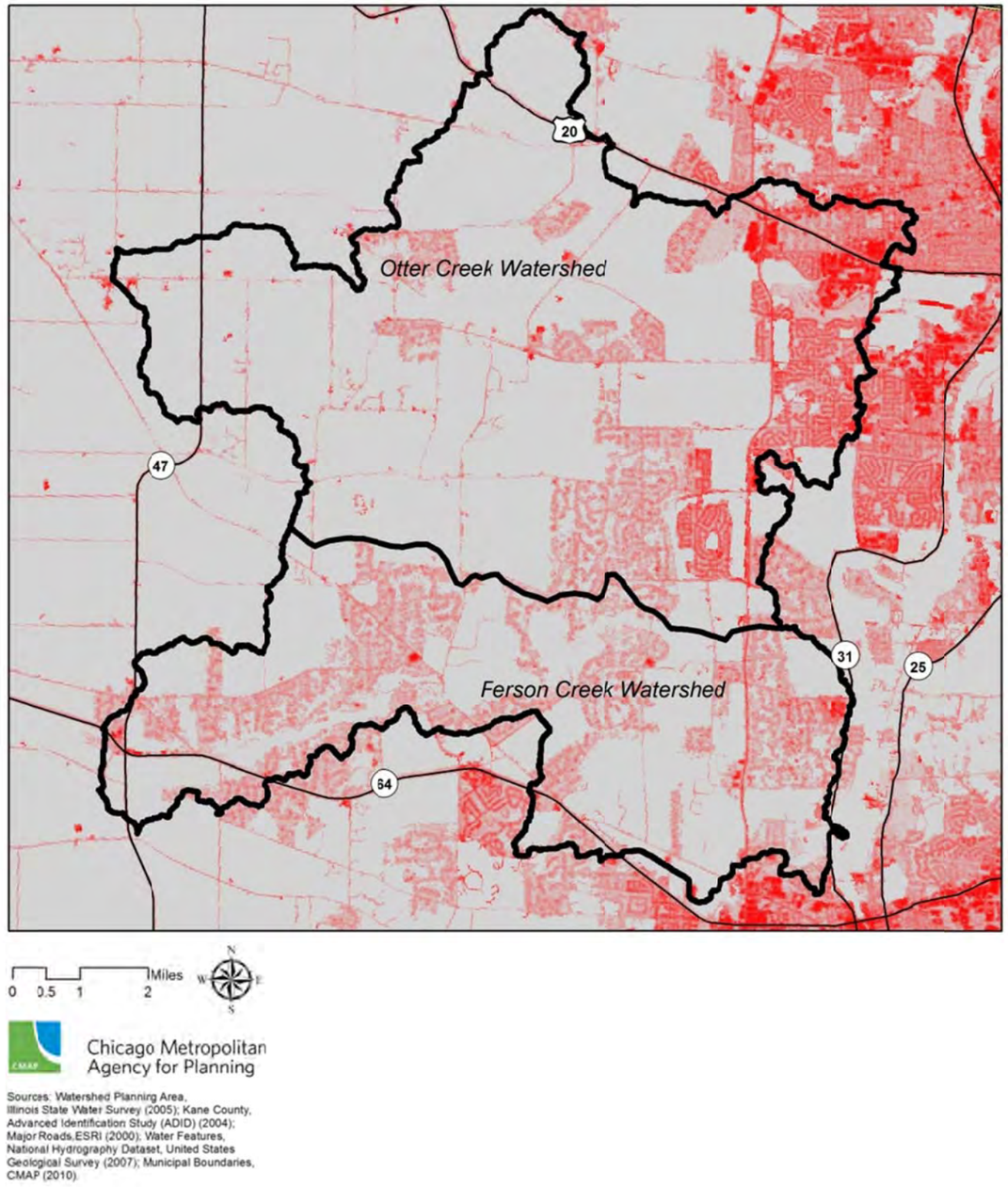
Impervious surface cover includes roofs, sidewalks, driveways, roads, parking lots, and other surfaces that restrict water infiltration on site and increase the quantity and decrease the quality of stormwater runoff. As of 2001, impervious surface covered less than 10% of the entire watershed planning area (Figure 7). At the watershed scale, this is encouraging since research indicates that impervious surface cover greater than 10% results in degraded water quality.[20] However, impervious surface in an amount beyond this threshold exists within every municipality, with the most impervious areas found in Elgin and South Elgin and moderate amounts of impervious areas located in unincorporated areas. Given the age of the data from which the analysis was done, it is highly likely that impervious surface cover has increased.

In general imperviousness increases with development, however, these increases of imperviousness can be minimized by using best management practices including low impact development principles. This topic will be covered in more detail in the Green Infrastructure section of Chapter 5.

### *Protected Open Space*

In this plan, protected open space includes publically and privately owned land. Combined, the watershed has approximately 3, 771 acres of protected open space, accounting for 11% of the watershed's land area (Figure 8).[21] Open space is a valuable resource for protecting water quality, among other benefits such as recreation and habitat. More information on open space is available in the Green Infrastructure section of Chapter 5.

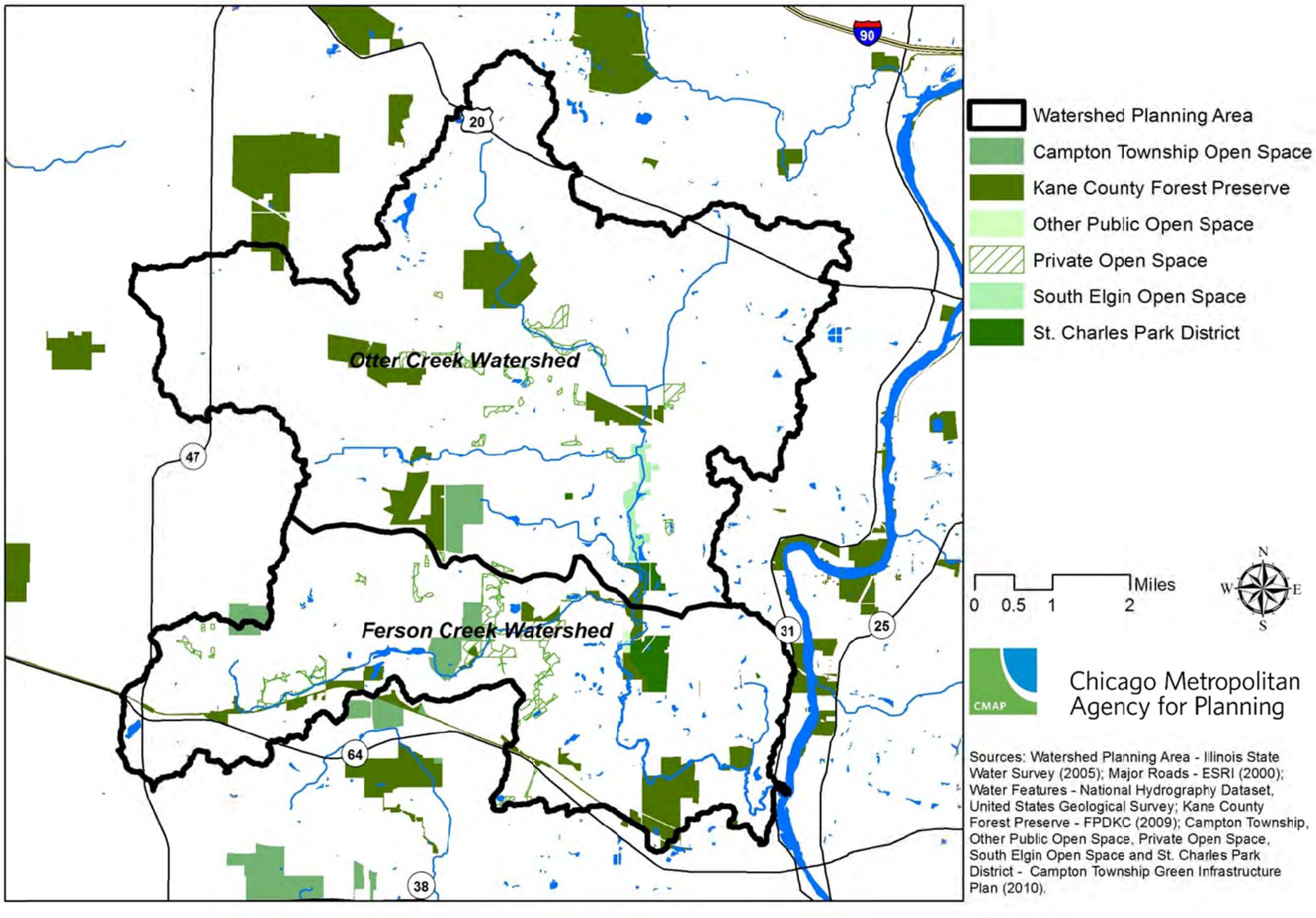
Figure 7. **Impervious surface in Ferson-Otter Creek Watershed**




[20] The Center for Watershed Protection. *Impacts of Impervious Cover on Aquatic Systems*. Mansfield, CT: University of Connecticut, 2003. http://clear.uconn.edu/projects/TMDL/library/papers/Schueler_2003.pdf (accessed November 8, 2011).

[21] See Figure 8.

Figure 8. **Protected open space in Ferson-Otter Creek Watershed**



### *Forest Management Plans*

The Illinois Department of Natural Resources (IDNR), Office of Resource Conservation, Division of Forestry, works with private landowners to reforest agricultural land and help with managing private woodlots. The Illinois Forestry Development Act (IFDA; 525 ILCS 15), funded in part by the U.S. Department of Agriculture (USDA) Forest Service, provides for this program. The IFDA created the Illinois Forestry Development Council, the Forestry Development Cost Share Program, and the Forestry Development Fund. Timber harvests in the State of Illinois are subject to a 4% harvest fee which helps to fund the cost-share component of the program.[22]

Ten acres of woods is the minimum land-area requirement, eleven acres if a home is present on the property. The program requires a landowner to develop an IFDA-approved management plan. With passage of the IFDA, the Illinois Property Tax Code was amended in order to provide a tax incentive to timber growers. In counties with less than 3,000,000 residents (i.e., all Illinois counties other than Cook), any land being managed in the IFDA is considered as "other farmland". Thus, the land is valued at one-sixth of its equalized assessed value based on cropland.

In northeastern Illinois, the program emphasizes exotic species removal and oak regeneration. Within the Ferson-Otter Creek Watershed, there are currently no properties enrolled in the IFDA program.

### *Agriculture*

The distribution of agricultural land throughout Ferson-Otter Creek Watershed is characterized from the 2005 CMAP Land Use Inventory. See Figure 9 for the distribution of agricultural land throughout these watersheds, a total of 11,596 acres.[23] Beyond the county-level, more detailed watershed-level statistics do not exist for agricultural land use and practices in Ferson-Otter Creek Watershed.[24] County-level statistics are available through the USDA 2007 Census of Agriculture. Kane County is 57% agricultural by land area and of this, 60% is planted in corn and 24% in soy.[25] Although row crop agriculture is the predominant agricultural land use in Kane County, the county also has a small amount of animal agriculture. Kane County accounts for 0.48% of livestock in Illinois, with 124,978 head.[26] Figure 9 shows the distribution of land used for livestock and equestrian purposes for Ferson-Otter Creek Watershed, a total of 694 acres.[27]

The Census also collects information on selected agricultural practices. Some of these practices are relevant to the discussion of agricultural impacts to water quality. For Kane County, a significant number of farmers employ some form of conservation practice: 33% of farms used some form of conservation method for crop production; 9% of farms practiced rotational or management-intensive grazing; and no farms grazed livestock on an animal unit month (AUM) basis.[28] Conservation practices include any of the several projects or management practices such as conservation tillage or nutrient management planning, described in the National Resource Conservation Service (NRCS) Illinois Field Office Technical Guides (FOTG) that are detailed more thoroughly below.[29] Rotational or management-intensive grazing both involve systematically moving livestock herds throughout available grazing lands according to a plan that is designed to most efficiently encourage forage growth and livestock health. For Kane County specifically, farmers most often use the following conservation practices: residue management (strip-, no- or mulch-tillage); nutrient management planning (monitoring soil nutrient levels and applying fertilizers only in needed amounts); and integrated pest management (using pest-resistant crop varieties, rotating crops and targeting areas for pesticide that exceed defined damage thresholds).[30]

In addition, 0.4% of agricultural land in Kane County is enrolled in the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Farmable Wetlands, or Conservation Reserve Enhancement Program (CREP) based on the Census.[31] Statewide, 3.3% of agricultural land is enrolled in one of these programs.[32] These are voluntary programs for agricultural landowners that provide assistance and incentives to farmers for conserving natural resources on private lands. CRP offers payments to farmers to establish environmentally beneficial plant cover on eligible croplands. The Wetlands Reserve and Farmable Wetlands programs both focus on wetlands, and in the first case, help farmers to protect or restore wetlands on their property, and in the second, enable farmers to prevent degradation of wetlands on land enrolled in CRP. Finally, CREP combines CRP resources with tribal, state and federal authorities for a community-based approach to conservation issues on private lands locally.

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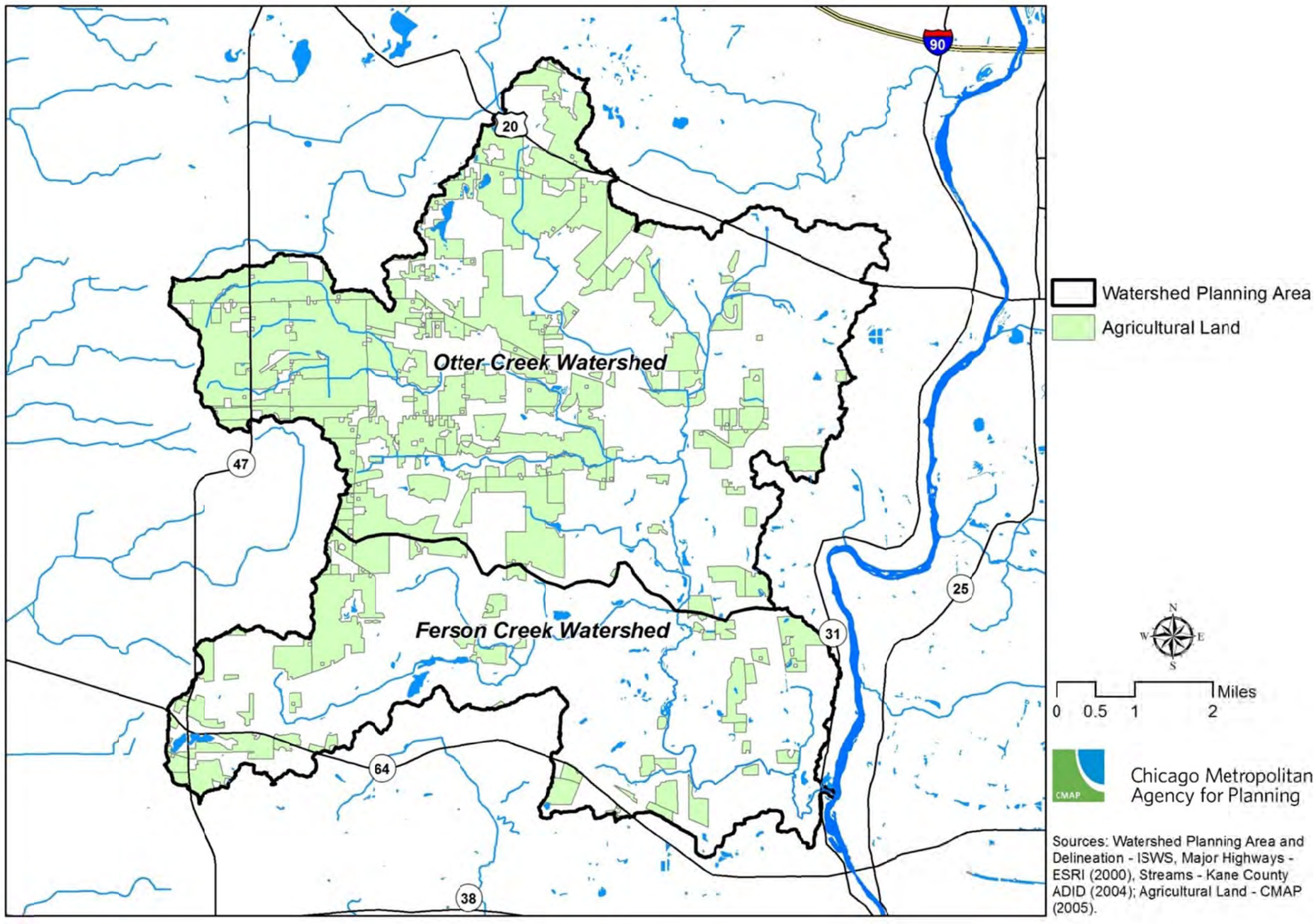
[22] IDNR. *Information Sheet: Illinois Forestry Development Act*. Springfield, IL: IDNR, June 2006. http://dnr.state.il.us/conservation/forestry/IFDA/ (accessed November 2, 2011).
[23] NIPC. *Land Use Inventory*. Chicago, IL: CMAP, 2005. http://www.cmap.illinois.gov/land-use-inventory (accessed September 14, 2011).
[24] Thomas Ryterske, NRCS Illinois District Conservationist, email message to author(s), June 27, 2011.
[25] USDA NASS. "County Summary Highlights: 2007." *2007 Census of Agriculture*, Illinois State and County Data, Volume 1, Geographic Area Series, Part 13, Chapter 2, Table 1, Report No. AC-07-A-13. Washington, D.C.: USDA NASS, December 2009. http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_County_Level/Illinois/index.asp (accessed August 31, 2011).
[26] Ibid.
[27] Ibid. 23.
[28] USDA NASS. "County Summary Highlights: 2007." *2007 Census of Agriculture*, Illinois State and County Data, Volume 1, Geographic Area Series, Part 13, Chapter 2, Table 44, Report No. AC-07-A-13. Washington, D.C.: USDA NASS, December 2009. http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_County_Level/Illinois/index.asp (accessed August 31, 2011). An *AUM* is the amount of forage necessary to sustain an animal for a month, varying by the type of animal. An AUM accounting system can be used to calculate the required grazing area for a herd, which informs appropriate stocking densities and timing of rotations when farmers are developing grazing patterns.
[29] USDA NRCS. *Field Office Technical Guides*. Kane County, Illinois. Washington, D.C.: USDA NRCS, 2011. http://efotg.sc.egov.usda.gov/efotg_locator.aspx?map (accessed September 13, 2011).
[30] Thomas Ryterske, NRCS Illinois District Conservationist, email message to author(s), June 27, 2011.
[31] Ibid. 28, Table 8.
[32] Ibid.

Figure 9. **Agricultural land in Ferson-Otter Creek Watershed**

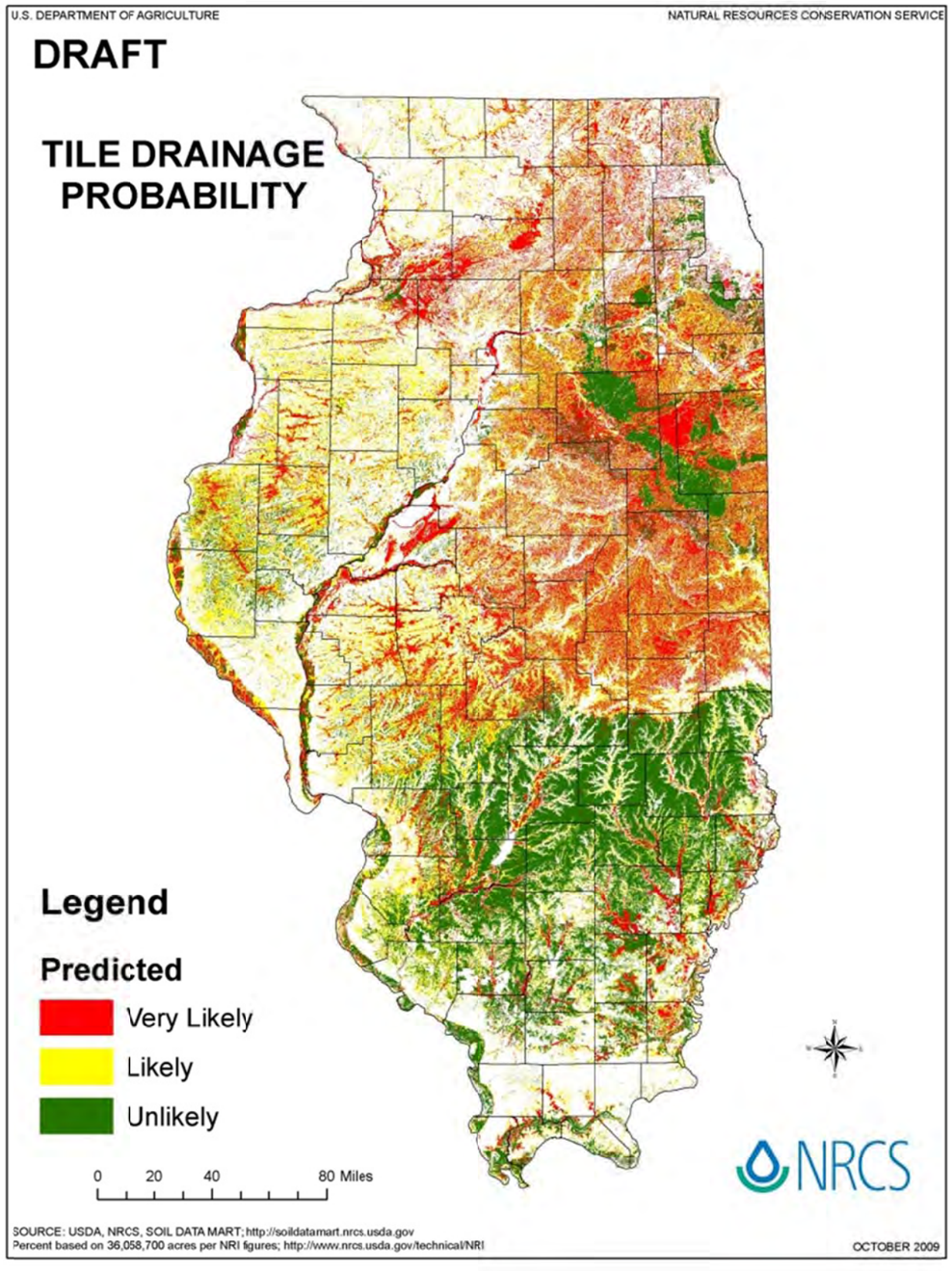


The likely extent of tile drainage in Ferson-Otter Creek Watershed is estimated here based on soil drainage classes. NRCS recognizes seven natural drainage classes describing the frequency and duration of wet periods for various soils. The drainage class for soil features is obtained from the SSURGO dataset (Soil Survey Geographic Database).[33] These classes are Excessively Drained, Somewhat Excessively Drained, Well Drained, Moderately Well Drained, Somewhat Poorly Drained, Poorly Drained and Very Poorly Drained.[34] The last three drainage classes indicate soils which limit or exclude crop growth unless artificially drained. Soils with the Somewhat Poorly Drained, Poorly Drained or Very Poorly Drained drainage class occur on 45% of the agricultural land in Ferson-Otter Creek Watershed. These areas can be taken as an approximation of the likely extent of artificial drainage on currently farmed agricultural lands, given that crop growth on these lands would be impossible or severely impacted without artificial drainage. The extent of soils with these drainage classes is depicted in Figure 11.

Some of these poorly drained areas were likely once wetland areas which are now farmed. There are nine sites identified as "Wetlands Being Farmed" in the CMAP 2005 Land Use Inventory on agricultural lands within Ferson-Otter Creek Watershed (Figure 12).[35] Officially, a Farmed Wetland is a wetland that has been modified to produce agricultural goods that also meets certain hydrologic conditions.[36] The CMAP classification, however, might not meet these criteria. "Wetlands Being Farmed" were identified for the CMAP 2005 Land Use Inventory from any features in the National Wetlands Inventory that are greater than 2.5 acres, on agricultural lands, and verified to be an existing wetland through aerial photography.[37] Farmed wetlands meeting the federal definition are often still wet enough to act as valuable wetland habitats that are subject to Swampbuster, the Wetland Conservation provision in the Farm Bill, and Clean Water Act Section 404, which regulates the management of wetland areas. Consequently, these nine sites with the CMAP "Wetlands Being Farmed" classification might be potential best management practices (BMPs) implementation sites for wetland restoration opportunities given sufficient interest and ability on the part of these private landowners. Additionally, they might require further investigation to determine whether they meet the federal Farmed Wetlands classification.

Finally, the SSURGO dataset from NRCS also includes information about the distribution of highly erodible lands (HEL). Highly erodible lands are those most vulnerable to significant amounts of erosion, and are identified according to a specific set of criteria defined in the Code of Federal Regulations. For Ferson-Otter Creek Watershed, 7% of the total land area is highly erodible, while 18% of all agricultural land is highly erodible. Soil surveys identify HEL soil units based on the erodibility index of the soil.[38] The erodibility index is calculated by dividing the potential average annual rate of erosion for each soil by the maximum annual rate of soil erosion that could occur without causing a decline in long-term productivity (also called the T level).[39] Erosion in turn is calculated according to the Universal Soil Loss Equation (USLE), which includes factors like rainfall and runoff (R); the degree to which the soil resists erosion (K); and a formula measuring slope length and steepness (LS).[40]

Figure 10. **Tile drainage probability in Illinois**




[33] USDA NRCS, Soil Survey Staff. *Soil Survey Geographic (SSURGO) Database*. Kane County, Illinois. Washington, D.C. http://soildatamart.nrcs.usda.gov (accessed September 14, 2011).
[34] Soil Conservation Service, Soil Survey Staff. *Soil Survey Manual*. USDA Handbook 18. Washington, D.C.: USDA NRCS, 1993. http://soils.usda.gov/technical/manual/ (accessed September 14, 2011).
[35] NIPC. *Land Use Inventory*. Chicago, IL: CMAP, 2005. http://www.cmap.illinois.gov/land-use-inventory (accessed September 14, 2011).
[36] "Highly Erodible Land and Wetland Conservation." *Code of Federal Regulations*. Title 7, Part 12 (1996). http://edocket.access.gpo.gov/cfr_2011/janqtr/pdf/7cfr12.2.pdf (accessed September 14, 2011).
[37] David Clark, Senior Analyst for CMAP, email message to author(s), September 14, 2011.
[38] "Identification of highly erodible lands criteria." *Code of Federal Regulations*. Title 7, Part 12 (2011). http://frwebgate3.access.gpo.gov/cgi-bin/PDFgate.cgi?WAISdocID=pEGmgU/11/2/0&WAISaction=retrieve (accessed October 3, 2011).
[39] Ibid.
[40] "Identification of highly erodible lands criteria." *Code of Federal Regulations*. Title 7, Part 12 (2011). http://frwebgate3.access.gpo.gov/cgi-bin/PDFgate.cgi?WAISdocID=pEGmgU/11/2/0&WAISaction=retrieve (accessed October 3, 2011).

Like wetlands, HEL lands are the focus of specific NRCS conservation efforts. The Highly Erodible Land Conservation Compliance Provisions in the Food Security Act of 1985 requires that under certain circumstances, farmers producing agricultural goods on lands deemed highly erodible lands must use a USDA-approved conservation system.[41] In addition, this Act established a stricter provision called Sodbuster (similar to the Swampbuster provision discussed above) requiring that under certain circumstances, farmers cultivating HEL lands must adopt a conservation system that reduces erosion to the T level.[42] Violations of either provision can result in the loss of some or all USDA program benefits to the farmer. Any HEL lands currently being farmed in the Ferson-Otter Creek Watershed (Figure 13) might be subject to these provisions, if these lands satisfy the criteria used to determine applicability of these provisions to specific properties.

[41] "Highly Erodible Land Conservation Compliance Provisions," USDA NRCS, accessed October 3, 2011, http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=SUBNAVIGATION&cid=nrcs143_008440&navid=100170150000000&pnavid=100000000000000&position=Welcome.Html&ttype=detail&pname=Highly%20Erodible%20Land%20Conservation%20Compliance%20Provisions%20|%20NRCS.
[42] Ibid.

Figure 11. **Drainage classes in Ferson-Otter Creek Watershed**

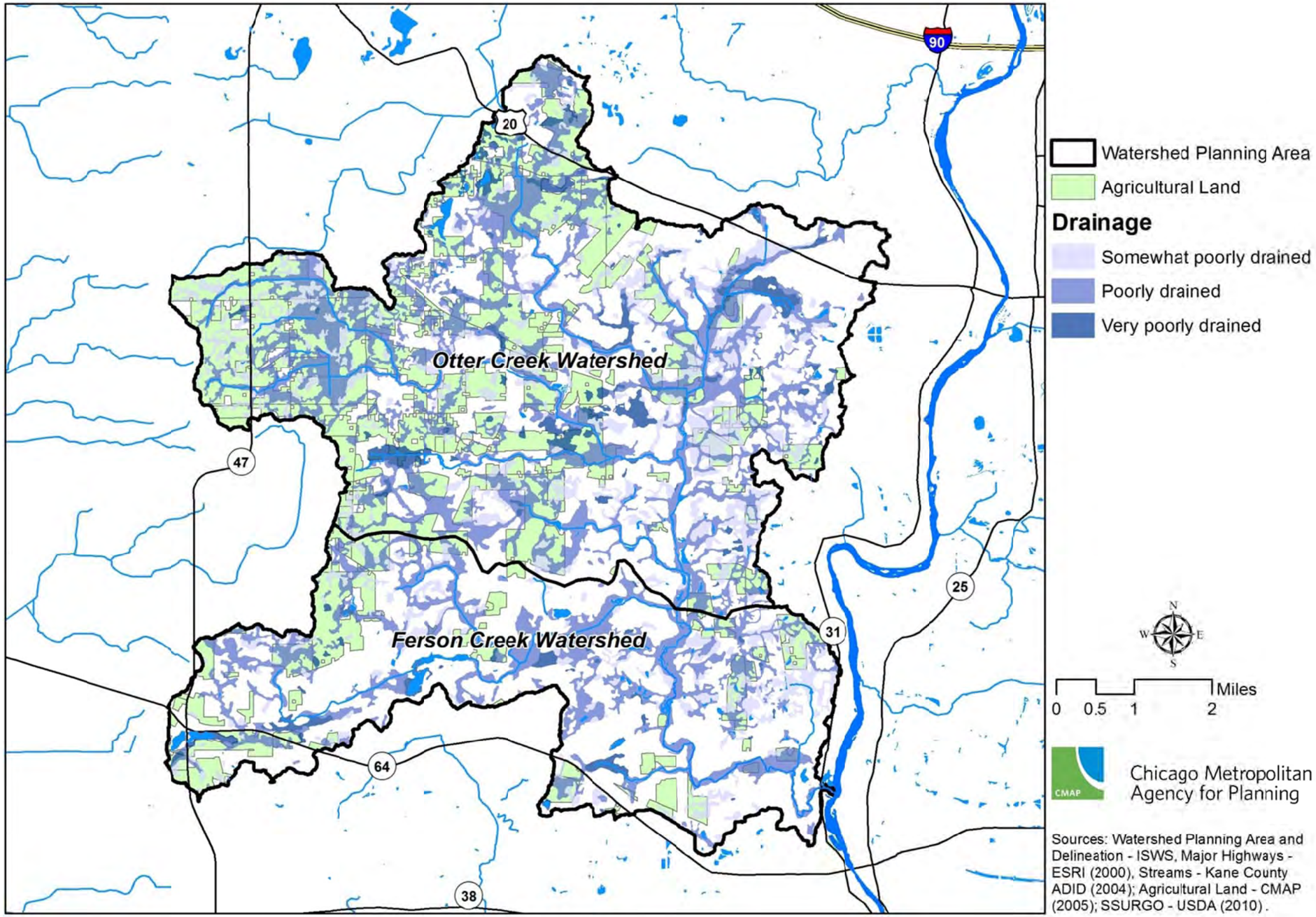


Figure 12. **Farmed wetlands in Ferson-Otter Creek Watershed**

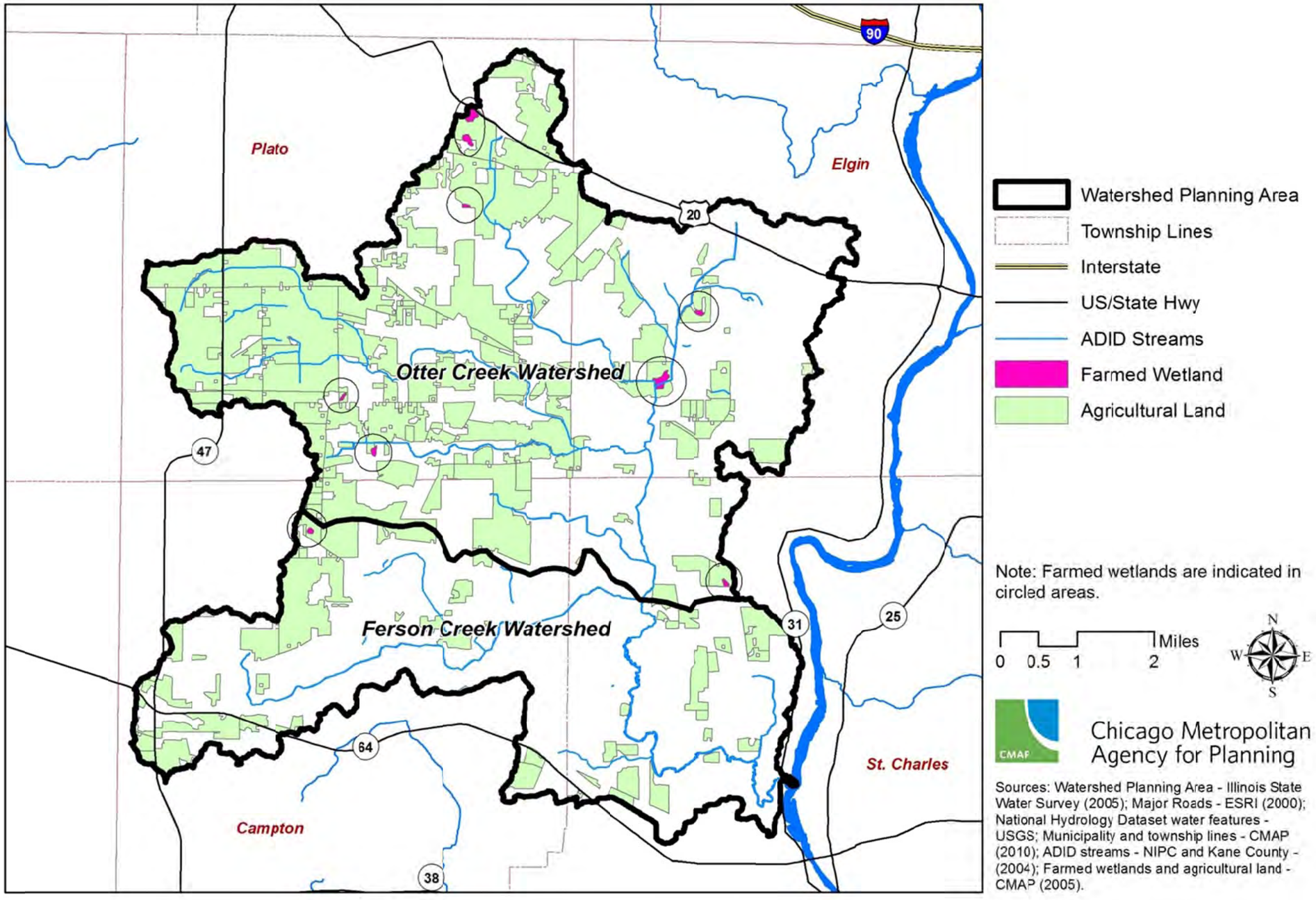
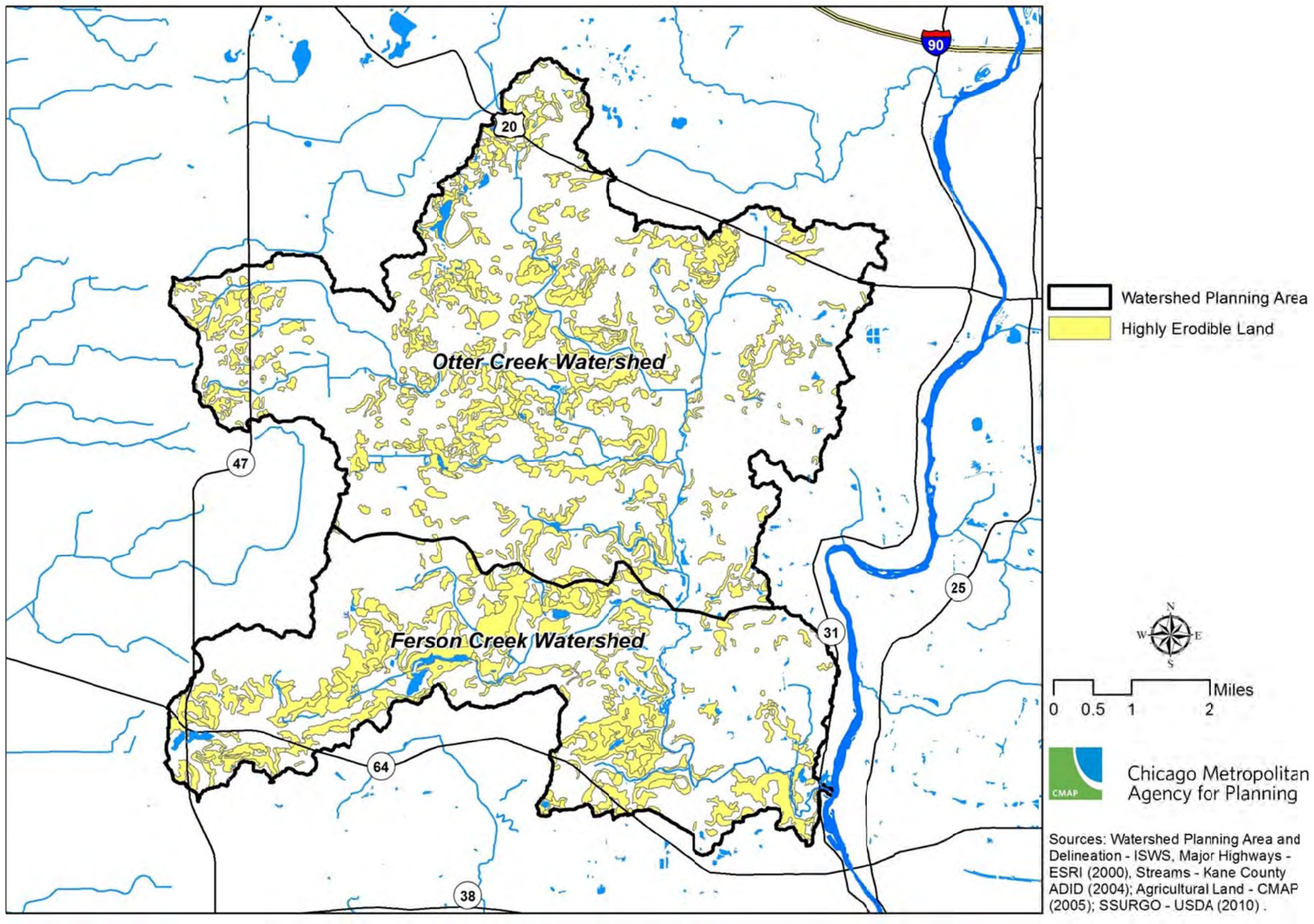


Figure 13. **Highly erodible land in Ferson-Otter Creek Watershed**



## 2.2.2 Topography

Elevation is highest in the western portion of the watershed and gradually lowers to the east as the land approaches the Fox River. Elevations range from 686 to 1060 feet above mean sea level (AMSL) for a total relief of 374 feet (Figure 14).[43] The majority of the watershed lies under 1000 feet AMSL. Agriculture is the dominant land use in the highest areas of the watershed (900 feet and above).

## 2.2.3 Soils

### *Hydric Soils*

The soils data is sourced from the Soil Survey Geographic (SSURGO) Database produced by the USDA, Natural Resources Conservation Services (NRCS).[44] While NRCS provides a wealth of information about the watershed's soils, this plan will focus on two datasets: Hydric Soils and Hydrologic Soil Groups. Figure 15 shows the range of hydric soils in the watershed from "All hydric" to "unknown." Hydric soils are those that are developed under sufficiently wet conditions such as flooding, ponding, or saturation for a long enough time period to support the growth and regeneration of hydrophytic vegetation, plants that grow partly or wholly in water. Thus, hydric soils are one indicator of the historic presence of wetlands, and among other matters, are useful in guiding wetland restoration efforts.

Partially hydric soils meet some but not all of the criteria and have the potential for hydric inclusion. Hydric soils make up 28.9% of the watershed and are spatially dispersed throughout the land area. Partially hydric soils make up 7.1% of the watershed, 1% of the soils are classified unknown, and 63.2% of the watershed contains nonhydric soils.

### *Hydrologic Soil Groups*

Another way to classify soils is through Hydrologic Soil Groups (HSG) as shown in Figure 16. Soil classification systems, including hydrologic groups, are used by planners, builders, and engineers among others to determine site suitability for projects. The four HSG are defined as Groups A-D, however some soils in our watershed have characteristics of multiple groups depending on site conditions. The following soils are present in the Ferson-Otter Creek Watershed:

- Group A: Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil.
- Group B: Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.
- Group B/D: The first letter applies to the drained condition and the second to the undrained condition.
- Group C: Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.
- Group D: Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Over 71% of the watershed planning area contains Group B soils. Both B/D and C soil groups cover about 12% each. Group B and B/D soils are dispersed throughout the watershed. Group C soils, however, are mainly concentrated along the eastern boundary of the watershed in parts of Elgin, South Elgin, St. Charles, and unincorporated Kane County. The location of the Group C soils coincides with the more developed portions of the watershed. Soil Groups A and D cover minimal areas in the watershed.

[43] CMAP. "Two Foot Topographic Contours." Geneva, IL: Kane County, Illinois, 2006.
[44] USDA NRCS, Soil Survey Staff. *Soil Survey Geographic (SSURGO) Database*. Kane County, Illinois. Washington, D.C. http://soildatamart.nrcs.usda.gov (accessed September 14, 2011).

Figure 14. **Elevation in Ferson-Otter Creek Watershed**

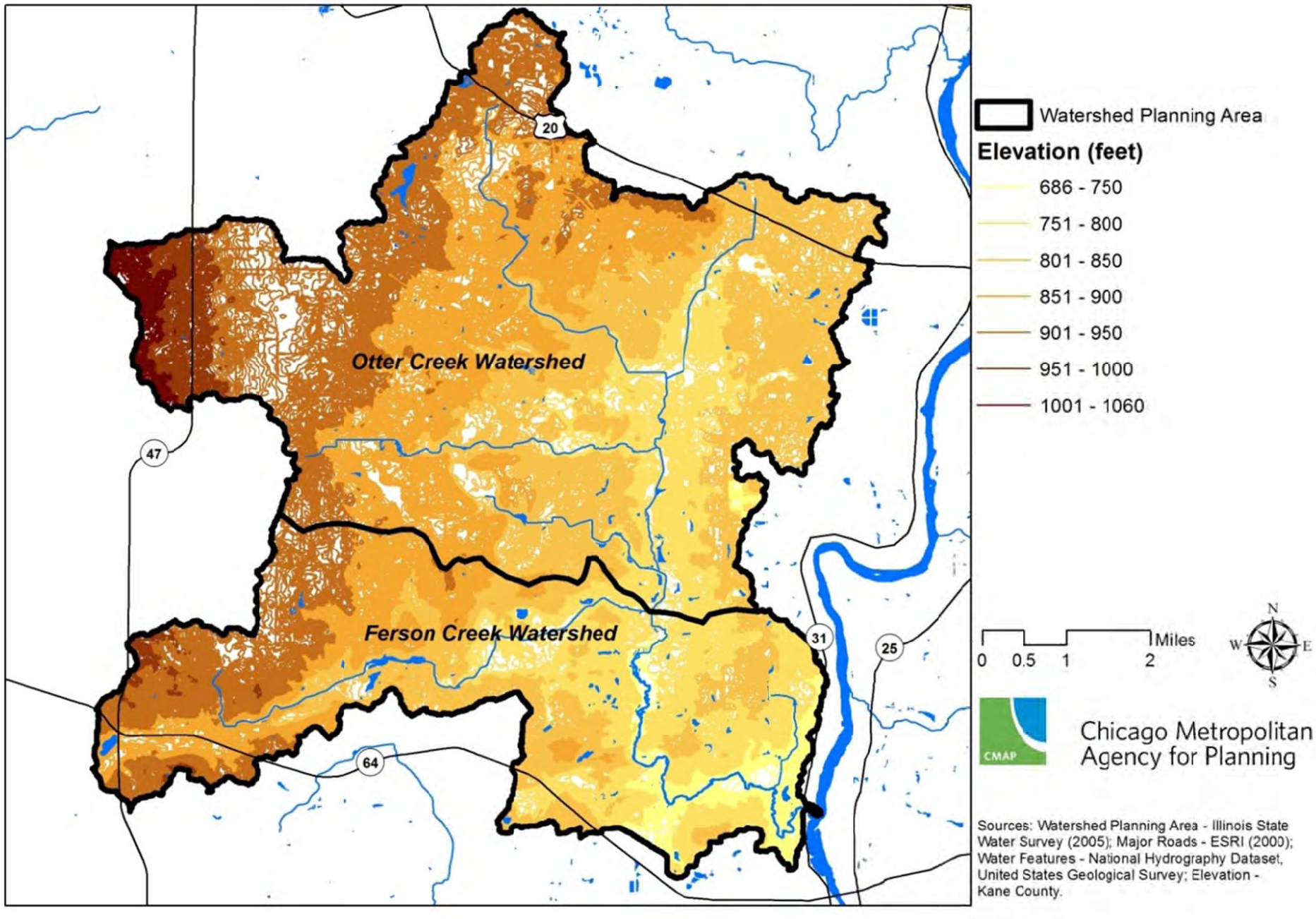


Figure 15. **Hydric soils in Ferson-Otter Creek Watershed**

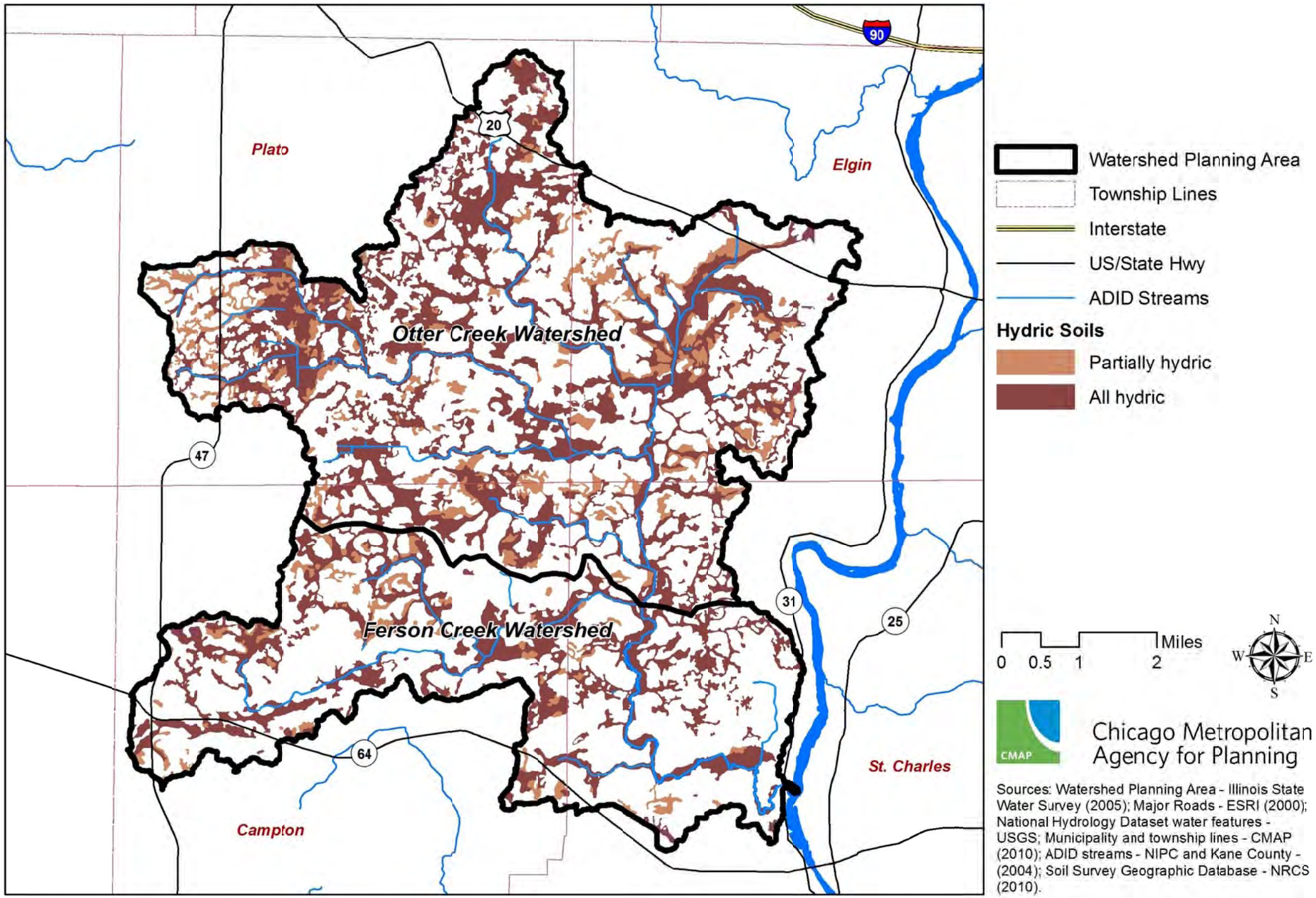
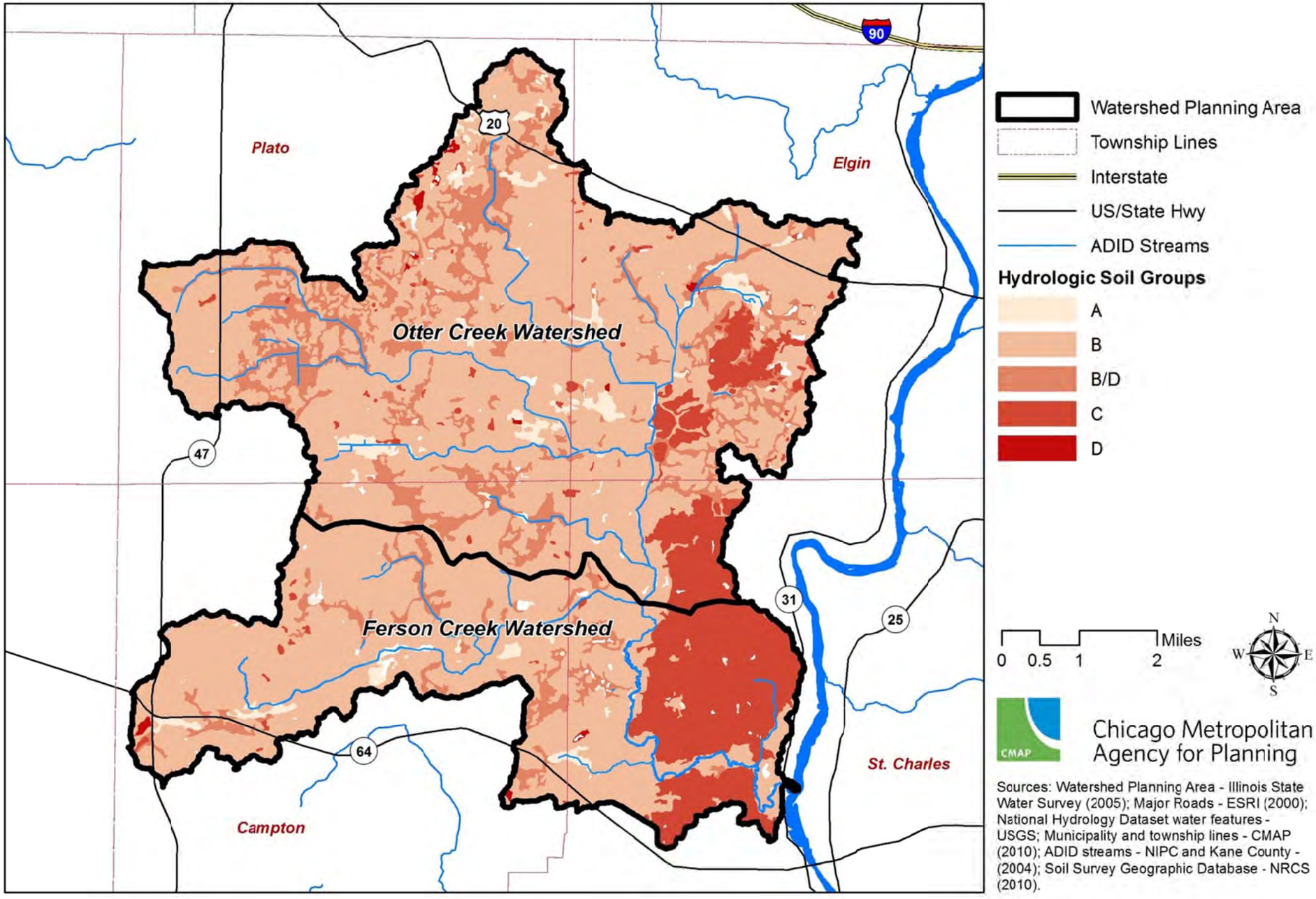


Figure 16. **Hydrologic soil groups in Ferson-Otter Creek Watershed**



## 2.2.4 Floodplains and Floodways

Floodplain and floodway data are sourced from Federal Emergency Management Agency (FEMA). A floodplain is defined as "any land area susceptible to being inundated by flood waters from any source."[45] However areas that are not directly adjacent to a body of water are often flooded in heavy storms. For example, the 100-year floodplain or base flood encompasses an area of land that has a 1-in-100 chance of being flooded or exceeded within any given year.[46] Whereas the 500-year floodplain has a 1-in-500 chance of being flooded or exceeded within any given year. If a natural floodplain is developed for any other use, such use becomes susceptible to flooding. This results in property and crop damage and degraded water quality. Therefore, floodplains and their relationship to land use should be considered in a watershed plan as well as any other type of land use planning.

Both floodplains and floodways are depicted in Figure 17. Floodways are defined by the National Flood Insurance Program as "the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height."[47] Floodways are a subset of the 100-year floodplain and carry the deeper, faster moving water during a flood event.[48] It should be noted that Kane County's Stormwater Ordinance addresses floodplain requirements that are applicable to all of the county's municipalities.[49]

## 2.2.5 Wastewater

### *Wastewater Treatment Plants*[50]

Under the National Pollutant Discharge Elimination Systems (NPDES), all facilities that discharge pollutants from any point source into surface waters of the United States are required to obtain a permit. This permit may assign pollutant limits, monitoring and reporting requirements and other provisions to protect surface water quality. In the watershed, only one NPDES permit was issued and is held by the privately owned Ferson Creek Utilities Sewage Treatment Plant (STP) to treat domestic wastewater for the majority of the Windings Subdivision in St. Charles (Figure 18).[51] The STP discharges into a Ferson Creek tributary that ultimately discharges into Lake Campton.[52] The current permit was issued in May of 2007 and is set to expire June 30, 2012 at which time it will need to be renewed. The design average flow (DAF) is 0.095 million gallons per day (MGD) with a design maximum flow (DMF) being 0.238 MGD. This is a relatively small-volume facility. Water quality treatment methods include manually cleaned bar screen, two-stage activated sludge, sedimentation, sand filters, chlorination and dechlorination. The 2007 permit contains water quality standards for the effluent and includes load limits for Carbonaceous $BOD_5$, Suspended Solids, Dissolved Oxygen, pH, Fecal Coliform, Chlorine Residual, Ammonia Nitrogen, and Phosphorus. The permit for fecal coliform is in line with the statewide standard discussed in the Chapter 3.

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[45] FEMA. Appendix D: Glossary. Washington, D.C. http://www.fema.gov/pdf/floodplain/nfip_sg_appendix_d.pdf (accessed November 8, 2011).
[46] "Flood Zones," FEMA, last modified August 11, 2010, accessed November 8, 2011, http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/flood_zones.shtm.
[47] "Floodway," FEMA, last modified August 11, 2010, accessed November 7, 2011, http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/floodway.shtm.
[48] Illinois Association for Floodplain and Stormwater Management. *Regulatory Floodways*. St. Charles, IL: Illinois Association for Floodplain and Stormwater Management, March 2006. http://www.illinoisfloods.org/documents/home_study_course/11%20Regulatory%20Floodways.pdf (accessed November 8, 2011).
[49] *Stormwater Management. Kane County, Illinois, County Code*, Chapter 9. http://www.sterlingcodifiers.com/IL/Kane%20County/index.htm (accessed December 19, 2011).
[50] This includes Sewage Treatment Plants (STPs).
[51] "Permit Compliance Systems (PCS)," U.S. EPA, accessed December 19, 2011, http://www.epa.gov/enviro/facts/pcs/search.html. Information found through Envirofacts for NPDES ID number IL0045411.
[52] Ibid. Main discharge number 001.

Figure 17. **Floodplains and floodways in Ferson-Otter Creek Watershed**

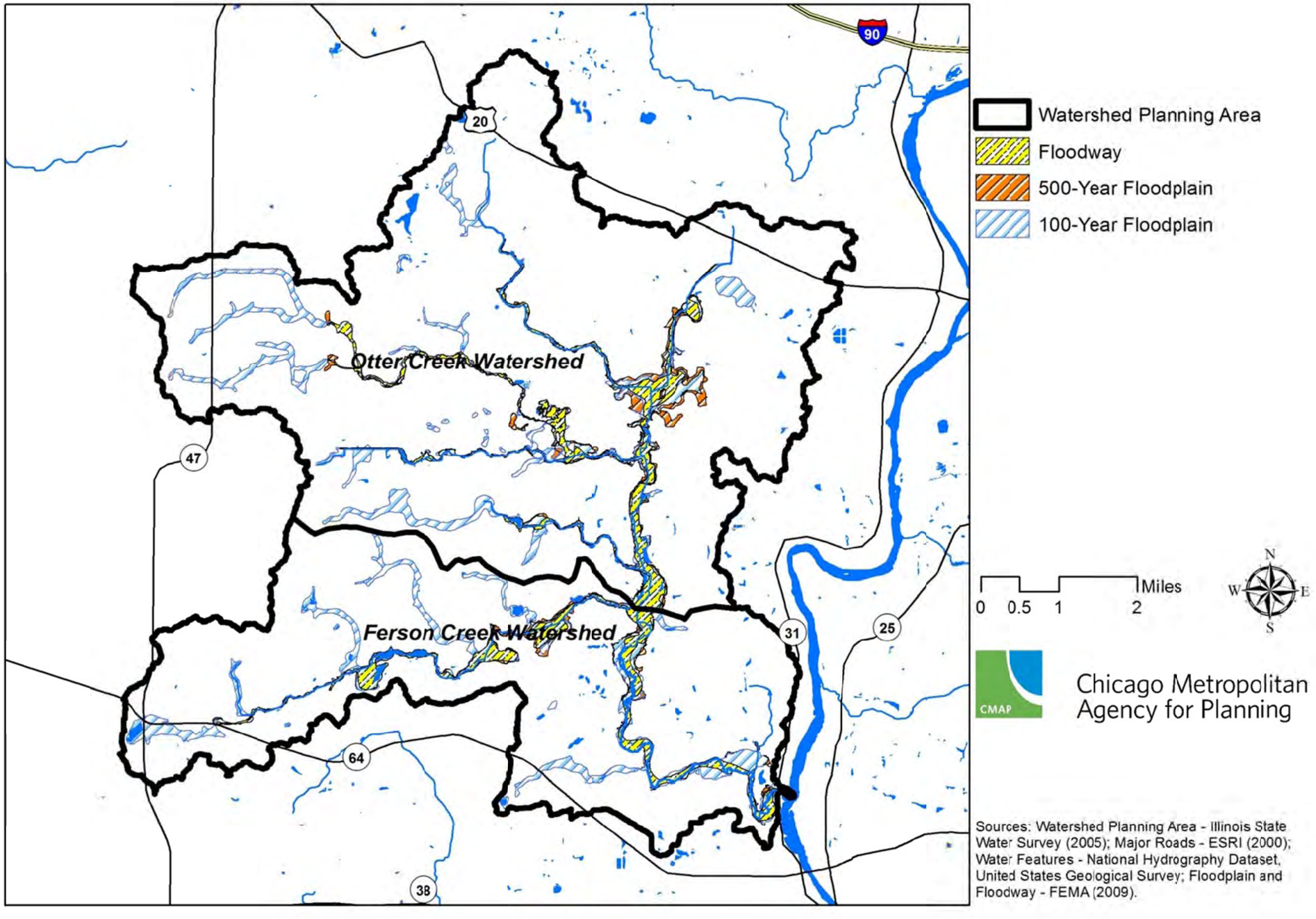
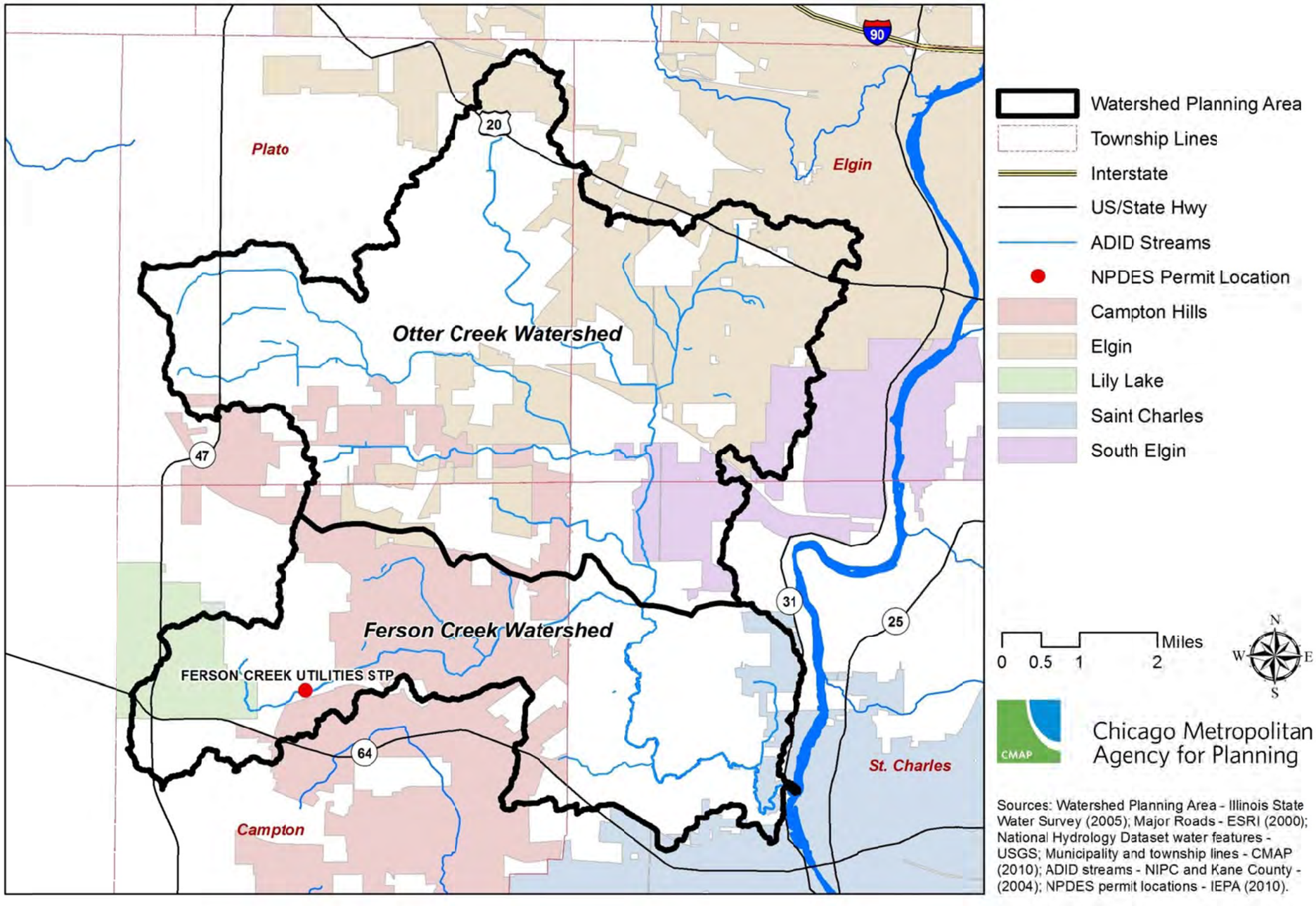


Figure 18. **NPDES permit locations**

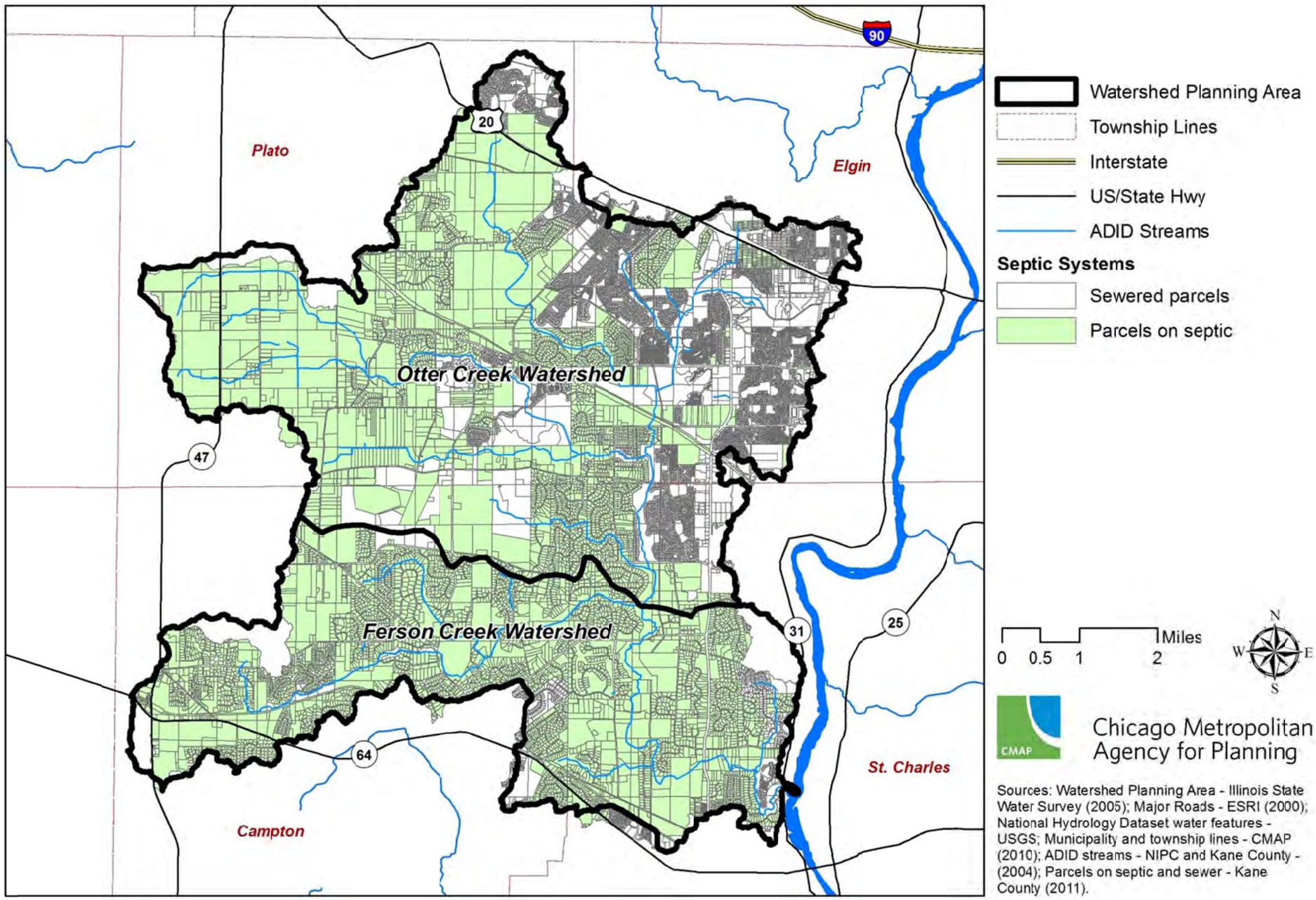


### *Septic Systems*

Kane County provided the data to identify parcels within the watershed that use septic systems (Figure 19). The data were created through the following steps: 1) The Kane County Health Department identified all subdivisions that are on septic within the watershed. 2) All parcels that fell within a sanitary district were deemed to NOT be on septic. 3) All parcels that fall within municipal boundaries that provide sewer service were deemed NOT to be on septic. 4) All remaining parcels were deemed to be on septic. As Figure 19 shows, the large majority - around 70% of the watershed – is likely on septic systems.[53] As stated above, Ferson Creek is impaired by fecal coliform and one potential source that can cause fecal coliform contamination is failing or improperly maintained septic systems.[54] For this reason, septic-related policies at the county level were examined and summarized as follows. Regular maintenance of septic systems is not required for homeowners with traditional septic systems. However those homeowners with aerobic treatment plants are required to have perpetual maintenance contracts on their units necessitating inspections twice a year. Failure rate of septic systems is not known, however the county does track renovation permits which could allude to a certain number of failures. Finally the county does not track or estimate house plumbing tie-ins to agriculture drain tile systems. If such situations are identified, correction is required. Kane County does offer an annual free or low-cost septic system class for residents to learn proper septic system care and provides an online guide.[55]

[53] Sean Glowacz, Land Use Planner for Kane County, email message to CMAP, April 29, 2011.
[54] It should be noted that currently there is no data identifying septic system failure as a source of contamination in Ferson-Otter Creek. Without more specific data, the planning process looked at a wide variety of potential causes include septic system failure. Kane County is aware of very few failed septic systems.
[55] "Kane County Environmental Health Services," Kane County Health Department, accessed December 19, 2011, http://www.kanehealth.com/water_waste.htm. Attendance is generally 25-40 people each year.

Figure 19. **Potential parcels on septic systems in the Ferson-Otter Creek Watershed**



### *MS4 Permits*

In addition to wastewater treatment plants, urban stormwater runoff is also regulated through NPDES.[56] The NPDES Stormwater Program was implemented in two phases. Phase I of this program was implemented in 1990 and applies to medium and large municipal storm sewer systems, as well as certain counties with populations of 100,000 or more; Phase II was implemented in 2003 and expands the scope of storm sewer systems which are subject to NPDES.[57] Unlike Phase I, Phase II applies to small municipal separate storm sewers (MS4's), including smaller construction or industrial sites that are owned and operated in urbanized areas.[58] Industrial sites or construction activities that disturb one or more acres of land must obtain an NPDES permit before construction activities begin.[59]

Under the terms of Phase II permits, industrial, construction, and MS4 Phase II permittees are required to implement certain practices that control pollution in stormwater runoff. To prevent the contamination of stormwater runoff, industrial and construction permittees must develop a stormwater pollution prevention plan (SWPPP), while MS4 permittees must develop a similar stormwater management program (SWMP). Stormwater runoff carrying pollutants from impervious surfaces can degrade water quality when discharged untreated into local rivers and streams, as is often the case. Programs like Phase II that encourage planning and implementation on a watershed basis are therefore vital for protecting water quality from stormwater runoff from both large and small separate stormwater sewer systems, as well as industrial and construction sites.

The following information focuses on the Phase II permit status of municipalities in the watershed planning area. As part of an integrated approach to stormwater pollution prevention, MS4 pollution prevention plans must address the following six minimum control measures: Public education and outreach, Public participation and involvement, Illicit discharge detention and elimination, Construction site runoff control, Post-construction runoff control, and Proper maintenance of pollution prevention controls.[60] The locations of NPDES Phase II permittees that comply with these control measures within Ferson-Otter Creek are shown in Table 3.

**Table 3. Municipal MS4 permit status within Ferson-Otter Creek Watershed**

| MUNICIPALITY | MS4 PERMITTEE | NUMBER |
|---|---|---|
| Campton Hills | No | |
| Elgin | Yes | ILR400333 |
| Lily Lake | No | |
| South Elgin | Yes | ILR400450 |
| St. Charles | Yes | ILR400454 |
| TOWNSHIP | | |
| Plato Township Hwy. Dept. | Yes | ILR400484 |
| Campton Township Hwy. Dist. | Yes | ILR400483 |
| St. Charles Township | Yes | ILR400131 |
| COUNTY | | |
| Kane County | Yes | ILR400259 |

[56] "NPDES Permit Program Basics," U.S. EPA, last modified January 4, 2011, accessed October 12, 2011, http://cfpub.epa.gov/npdes/home.cfm?program_id=45.
[57] "NPDES Stormwater Program," U.S. EPA, last modified January 4, 2011, accessed October 13, 2011, http://cfpub.epa.gov/npdes/home.cfm?program_id=6.
[58] Ibid.
[59] U.S. EPA. "Stormwater Phase II Final Rule: An Overview." EPA Report No. 833-F-00-001. Washington, D.C.: U.S. EPA, 2005. http://www.epa.gov/npdes/pubs/fact2-0.pdf (accessed October 12, 2011).
[60] Ibid.

## 2.2.6 Groundwater Protection

### *Recharge Areas*

This plan considers groundwater protection in addition to surface water quality. Aquifer recharge areas are critical to groundwater protection from both quality (i.e., vulnerable to contamination) and quantity (i.e., infiltration capacity) standpoints. As identified by USGS, the main recharge area is located in and nearby Lily Lake and extends north beyond the watershed. The data are sourced from the 2006 United States Geological Survey (USGS), Campton Township Groundwater Study.[61]

### *Aquifer Sensitivity to Contamination*

Certain areas in the watershed are more vulnerable to aquifer contamination from land use activity than others. Kane County commissioned a study to classify sensitivity ranges from Unit A-D with "A" having the highest potential for contamination and "D" having the lowest.[62] Each classification is qualified by distance to land surface and the degree of aquifer thickness. This plan focuses on Unit A, defined as "areas where the upper surface of the aquifer is within 20 feet of the land surface and with sand and gravel or high-permeability bedrock aquifers greater than 20 feet thick."[63] Table 4 further explains Unit A's 4 subcategories A1-A4.

**Table 4. Aquifer sensitivity to contamination**

| SUBCATEGORY | AQUIFER THICKNESS | LAND (WITHIN) SURFACE DEPTH |
|---|---|---|
| A1 | X[1] > 50 feet | X[2] < 5 feet |
| A2 | X > 50 feet | 5 < X < 20 feet |
| A3 | 20 < X < 50 feet | X < 5 feet |
| A4 | 20 < X < 50 feet | 5 < X < 20 feet |

1 X=the number of feet thick the aquifer is.
2 X=number of feet the aquifer is within the land surface.

Within the county, Unit A areas are common in southern and northwestern sections and along the Fox River (Figure 20). Within the planning area, sensitive-aquifer areas are more common in Otter Creek than in Ferson Creek. These areas have the highest potential for contamination due to the presence of sand and gravel deposits that allow for contaminants to move rapidly through to wells or nearby streams.

[61] USGS. *Hydrogeology, Water Use, and Simulated Ground-Water Flow and Availability in Campton Township, Kane County, Illinois*, by Robert T. Kay, Leslie D. Arihood, Terri L. Arnold, and Kathleen K. Fowler. Scientific Investigations Report 2006–5076. Reston, VA: USGS, 2006. http://pubs.usgs.gov/sir/2006/5076/pdf/sir20065076.pdf (accessed November 7, 2011).
[62] ISGS. "Kane County Water Resources Investigations: Final Report on Geologic Investigations," by William S. Dey, Aec M. Davis, B. Brandon Curry, Donald A. Keefer and Curt C. Abert. ISGS Open File Series, 2007-7. Champaign, IL: ISGS, 2007. http://library.isgs.uiuc.edu/Pubs/pdfs/ofs/2007/ofs2007-07.pdf (accessed November 3, 2011).
[63] Ibid. It should be noted that aquifer sensitivity classification rates sequence from Map Unit A to Map Unit E in order of decreasing sensitivity to aquifers becoming contaminated. For this plan, only Map Unit A category (High Potential for Aquifer Contamination) is shown in the resource inventory. However subsequent categories such as Map Unit B (Moderately High Potential for Aquifer Contamination) should be considered for planning purposes when appropriate.

### *Leaking Underground Storage Tank (LUST) Sites*

IEPA has identified 30 Leaking Underground Storage Tanks, or LUST sites within the watershed (Figure 20).[64] These sites could be contaminated by gasoline or diesel fuel from leaks, spills, or overfills from when the tanks were in use. In any case, the concern is that LUST sites pose a threat of contamination to soil, groundwater, streams, rivers, and lakes in watersheds, such as this one, that are predominantly dependent on groundwater as a potable water supply source.

### *Groundwater Geology*

In Kane County, materials from the Quaternary geological period (2.6 million years ago to the present) overlie older Paleozoic bedrock, primarily Silurian limestone and dolomite or Ordovician shale.[65] The Cambrian-Ordovician bedrock forms a deep aquifer system, typically 800 to 1,500 feet deep, throughout the entire region that is heavily developed for groundwater pumping.[66] Quaternary materials are also a source of groundwater, forming shallow aquifers from which wells pump water. Quaternary materials include sand, gravel, peat and floodplain alluvium. The sand and gravel in Quaternary materials act as aquifers when they are saturated with water because their porosity and hydraulic conductivity are high, allowing water to flow freely.[67]

### *Shallow Aquifers*

Many of the Quaternary aquifer systems previously described are major, meaning in this region that they yield pumped water at a rate of at least 70 gallons per minute.[68] These major aquifers, mapped for Kane County by the Illinois State Geological survey, are pictured in Figure 21.[69] The St. Charles, Kaneville and some unnamed formations are the predominant major aquifers in the watershed planning area.

### *Well Setback Zones*

Community well systems (CWS) are subject to the Illinois Groundwater Protection Act (IGPA; P.A. 85-0863). Passed in 1987, IGPA emphasizes the comprehensive management of groundwater resources by requiring the implementation of practices and policies that protect groundwater through prevention-oriented approaches.[70] Among these approaches, IGPA guides federal, state and local government in setting groundwater protection policies; assessing the quality and quantity of groundwater resources being utilized; and establishing groundwater quality standards.

One concrete action required by IGPA is that municipalities establish setback zones for CWS wells. Well setback zones help to prevent contamination of groundwater resources with pollution by restricting certain land uses within the setback zone. Industrial, commercial, municipal, agricultural or residential land uses could be restricted by a setback zone given their potential contribution of pollutants and contamination of groundwater. Under IGPA, a 200 or 400 foot minimum setback zone is mandated for CWS wells, depending on the sensitivity of a particular well to possible contamination.[71] The 400 foot setback zone is specified for wells deemed "vulnerable" to contamination based on the depth or character of the aquifer supplying the well. IGPA empowers municipalities to adopt more stringent ordinances to protect groundwater resources. For well setback zones, municipalities can voluntarily adopt ordinances requiring a maximum setback zone of 1,000 feet around certain eligible wells.[72]

Well setback zones have been depicted for CWS wells in Ferson-Otter Creek Watershed (Figure 22). A 400 foot setback is shown for all shallow wells, which are more susceptible to contamination, while a 200 foot setback is shown for the less vulnerable deep wells. Maximum well setback zones are also illustrated in Figure 22. Well location data were obtained from IEPA for CWS wells on both shallow and deep aquifers.[73] For this dataset, Table 5 summarizes the number of wells within the watershed planning area utilized by each municipality.

**Table 5. Municipal groundwater well designation**

| MUNICIPALITY | SHALLOW AQUIFER WELLS | DEEP AQUIFER WELLS |
|---|---|---|
| Campton Hills | 2 | 1 |
| Elgin | 1 | 3 |
| Lily Lake | - | - |
| St. Charles | - | 5 |
| South Elgin | - | - |

[64] "Leaking Underground Storage Tank Program," IEPA, accessed November 2, 2011, http://www.epa.state.il.us/land/lust/index.html. LUST is often interchanged with Underground Storage Tanks (UST).
[65] Edward Mehnert. "Groundwater Flow Modeling as a Tool to Understand Watershed Geology: Blackberry Creek Watershed, Kane and Kendall Counties, Illinois." *Circular 576*, Champaign, IL: ISGS, 2010. http://www.isgs.uiuc.edu/maps-data-pub/publications/monthly/jun-10-pubs.shtml (accessed November 3, 2011).
[66] "Center for Groundwater Science: Northeastern Illinois," ISWS, accessed October 26, 2011, http://www.isws.illinois.edu/gws/neillinois.asp.
[67] ISGS. "Kane County Water Resources Investigations: Final Report on Geologic Investigations," by William S. Dey, Alec M. Davis, B. Brandon Curry, Donald A. Keefer and Curt C. Abert. *ISGS Open File Series*, 2007-7. Champaign, IL: ISGS, 2007. http://library.isgs.uiuc.edu/Pubs/pdfs/ofs/2007/ofs2007-07.pdf (accessed November 3, 2011).
[68] Ibid.
[69] Ibid. 74.
[70] *Illinois Groundwater Protection Act*. *Ill. Comp. Stat*. 415 (1987), § 55. http://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=1595&ChapAct=415%A0ILCS%A055/&ChapterID=36&ChapterName=ENVIRONMENTAL%20SAFETY&ActName=Illinois%20Groundwater%20Protection%20Act (accessed October 12, 2011).
[71] Ibid.
[72] "Maximum Setback Zones," IEPA, accessed October 12, 2011, http://www.epa.state.il.us/water/groundwater/maximum-setback-zones/.
[73] Wade Boring, Manager Geographic Analysis, Illinois Environmental Protection Agency (IEPA), email message to author(s), July 22, 2011.

Figure 20. **Recharge areas, aquifer sensitivity to contamination, and LUST sites**

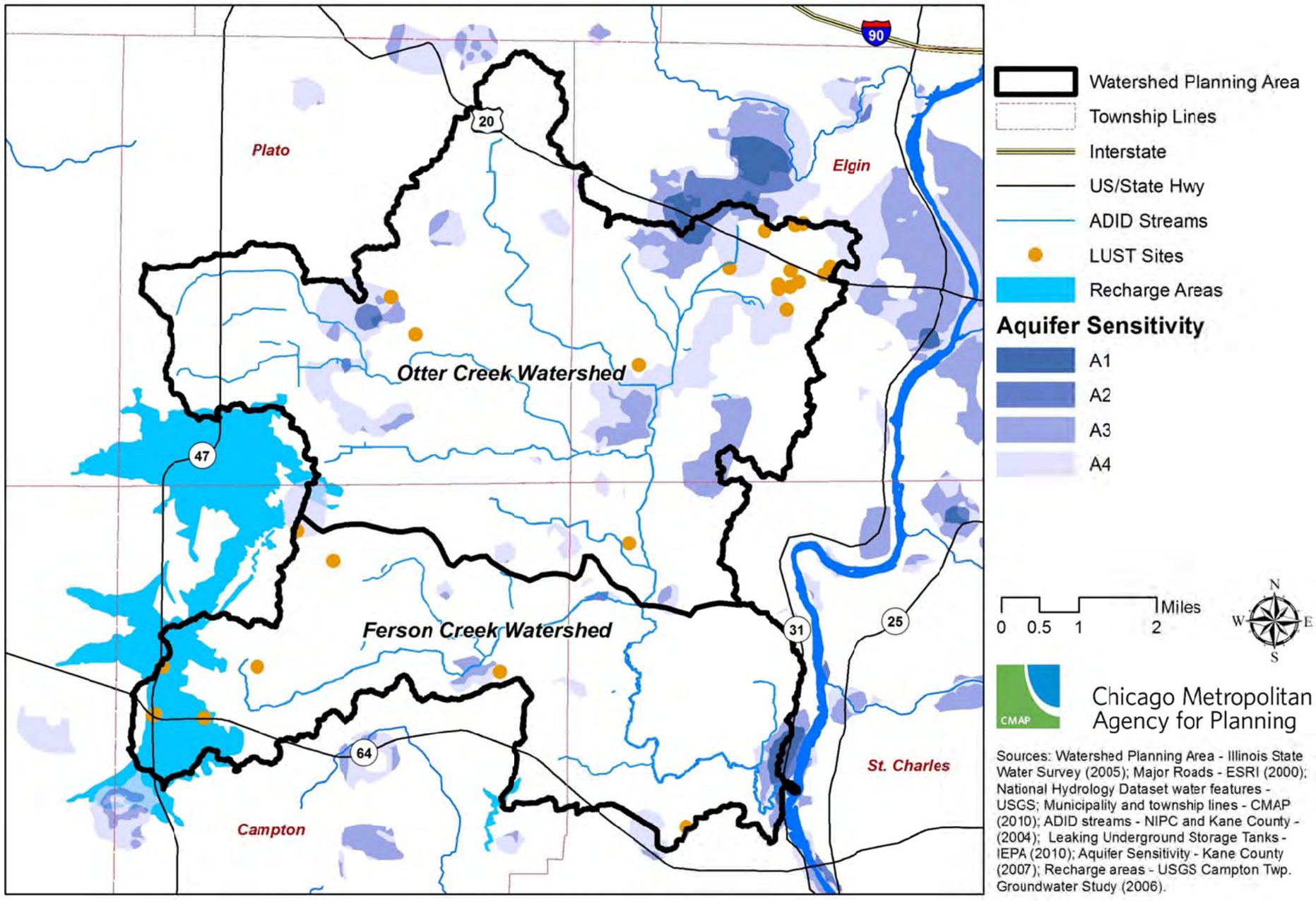


Figure 21. **Major aquifers in Ferson-Otter Creek Watershed**

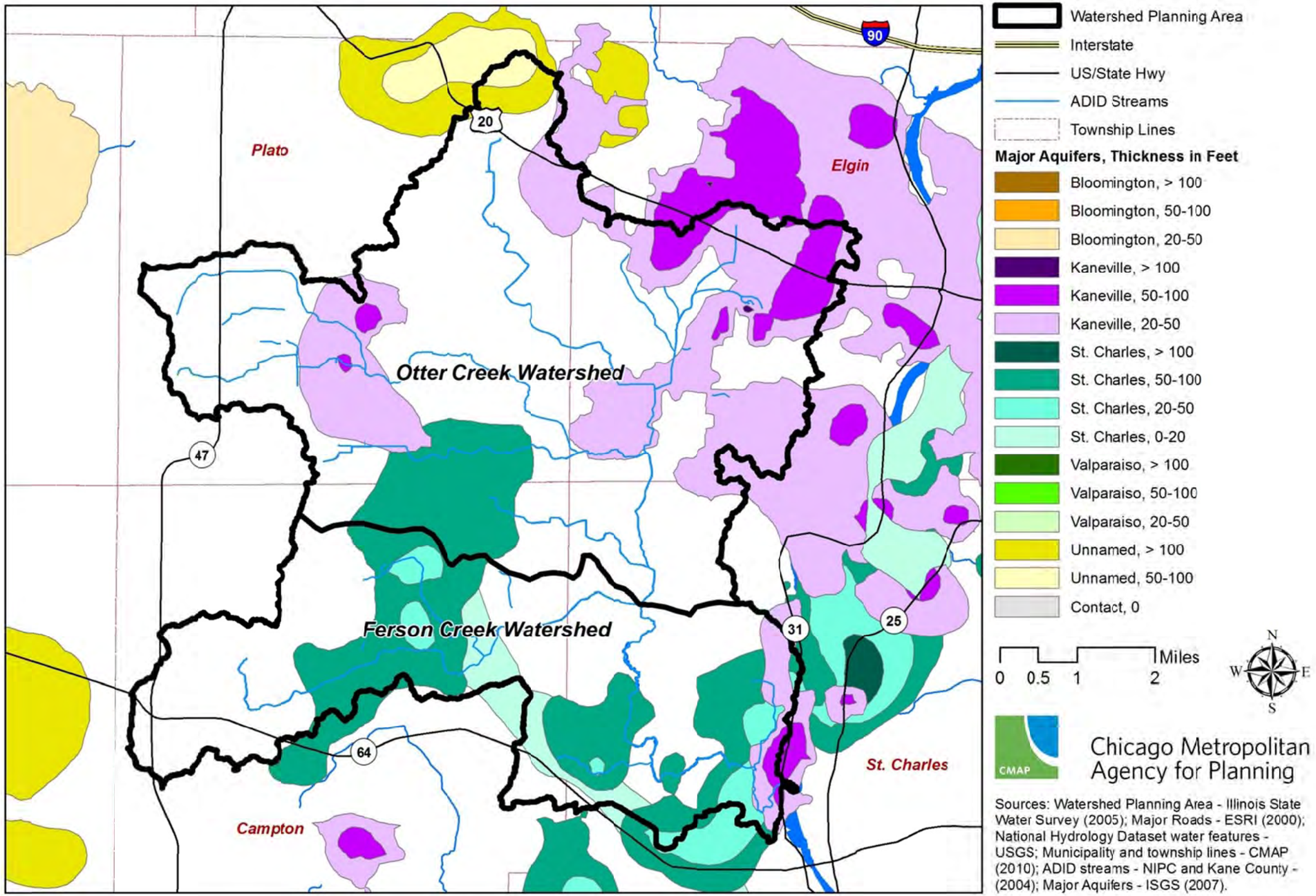
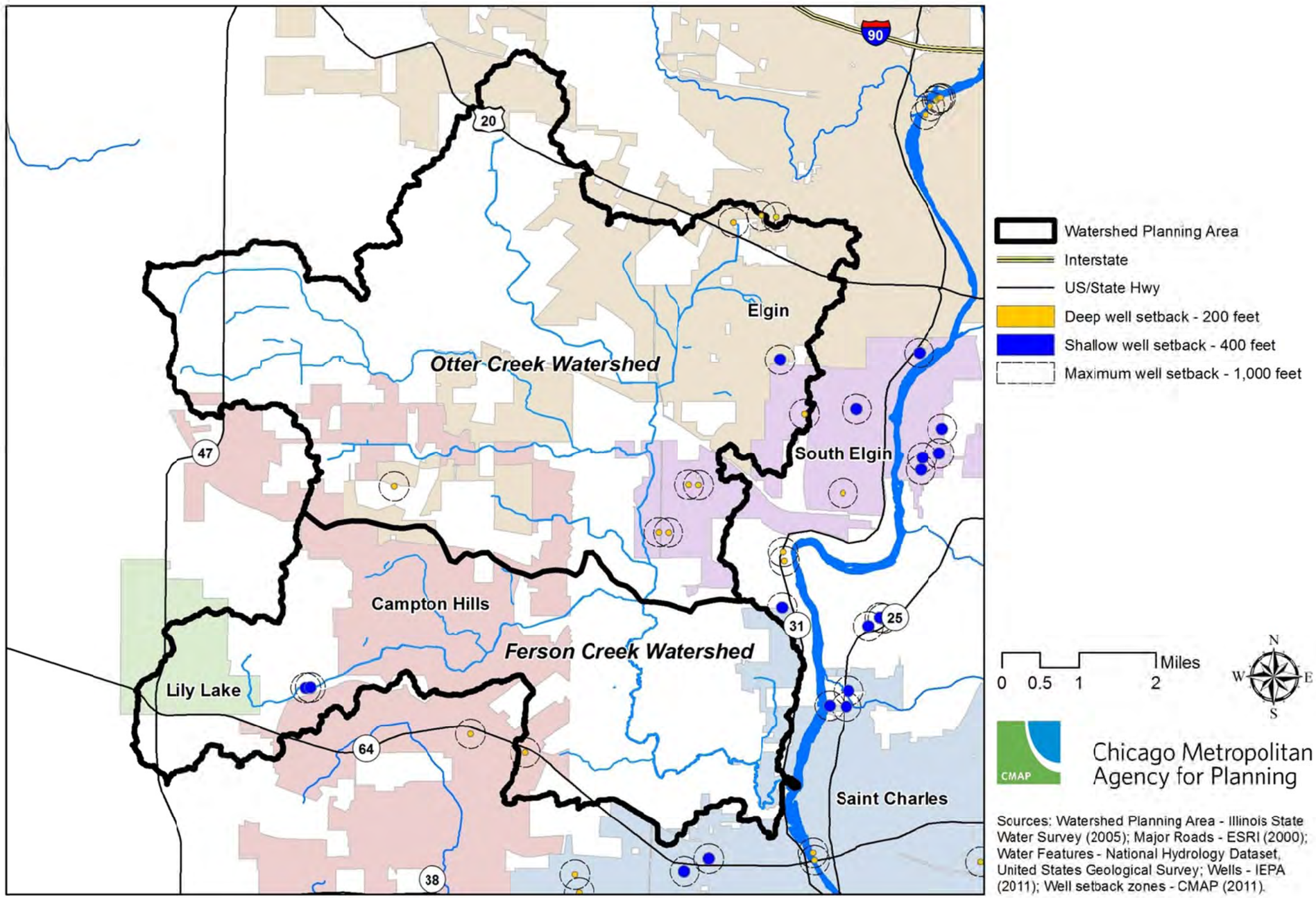


Figure 22. **Well set back locations**



## 2.2.7 Wetlands and Streams

The wetland and streams data are taken from Kane County's Advanced Identification (ADID) Study produced in August of 2004.[74] The ADID study was a cooperative effort between federal, state, and local agencies including the Chicago Metropolitan Agency for Planning, U.S. Fish and Wildlife Service, Chicago Illinois Field Office, USEPA, Region 5, and Kane County Department of Environmental Management. This study inventoried, evaluated, and mapped high quality wetland and stream resources in the county with the primary purpose of identifying wetlands and streams unsuitable for dredging and filling because they are of particular high quality. Incorporating this data into planning, zoning, permitting, land acquisition, and related decision making is one intended application of this data. As of 2004, Kane County has 27,368 acres of wetlands covering 8.2% of the total land area. This is a small portion of the wetlands that existed pre-settlement. Most of the wetland acreage has been degraded. In the Ferson-Otter Creek Watershed, there are approximately 3,967 acres of mapped wetlands accounting for 11% of the watershed land area.

Figure 23 illustrates two ADID components, wetlands and streams, of which there are three types. The first type is "High Habitat Value Wetlands and High Quality Streams" which have been identified as having high quality wildlife habitat, high floristic quality, or high quality aquatic habitat. This group is considered "unmitigatable" due to the complex biological systems and functions they provide and it is stated that they cannot be "successfully recreated within a reasonable time frame using existing mitigation methods."[75] The second is "High Functional Value wetlands" which provide water quality and stormwater storage benefits to the county. The third type is simply called "Other Wetlands and Streams." This last type includes all other wetlands and streams not included in the first two types either because they were not thoroughly evaluated or they were evaluated but did not meet the criteria for high habitat value or high functional value. This last type also includes all headwater streams.

It should be noted that there are some natural meander scars and historical floodplain terraces of Ferson Creek in the Leroy Oakes Forest Preserve. These areas depict streams in the watershed prior to European settlement and can create a vision on how to naturalize other stream reaches.

## 2.2.8 Lake Campton

### *Brief History and Background*

Lake Campton is an impoundment lake, created in 1953 by the construction of a 15 foot high earthen dam across Ferson Creek.[76] Two 24-inch valve pipes and one 10-inch pipe[77] were built into the dam to allow the lake level to be drawn down.

The lake is owned and managed by the Lake Campton Property Owners Association (LCPOA), which formed in the mid-1960s.[78] The lake is used recreationally for fishing, nonpower and electric-powered boating, ice skating, and aesthetic enjoyment. Lake access is available to LCPOA members and their guests. Lake management activities have included fish population surveys, fishery rehabilitations, fish stocking, water quality monitoring, and annual nuisance/ invasive aquatic plant control. In years past during dry summer months, the valves in the dam were reportedly opened to provide some water movement and flushing of the lake. This practice has not been conducted for at least 20 years and it is unknown whether the valves are still operable.[79]

### *Hydrological Description*

Lake Campton lies within the Ferson-Otter Creek Watershed of the Fox River Basin, which itself is part of the Illinois River Watershed and subsequently the Upper Mississippi Watershed. The area that drains to Lake Campton is approximately 3,900 acres (6.12 sq. miles).[80]

"Normal" lake elevation is equal to the elevation of the crest of the outlet spillway: 810.3 feet above mean sea level. At this water level, Lake Campton has a surface area of about 27 acres,[81] maximum depth of approximately 9 feet, an estimated average depth of 3 feet,[82] and a calculated volume of about 82 acre-feet (surface area x average depth). Average water residence time was calculated to be roughly 0.03 years using the watershed area, lake volume, and an average annual runoff value of 10 inches/year.[83] Data is summarized in Table 6.

Lake Campton receives its water via surface water flowing in from Ferson Creek at the lake's northwest corner, rain and snowmelt flowing off the land surrounding the lake, and precipitation directly onto the lake surface. The wetlands to the south/southwest of the lake, now owned in part by a local school district and the Forest Preserve District of Kane County, are connected to Lake Campton via a pipe that directs overflow to the lake during wet periods.[84] Outflow from the lake passes over the dam's concrete spillway located at the east end of the lake. Ferson Creek continues approximately 3½ miles downstream to its confluence with Otter Creek and then another 5½ miles down to the Fox River. Water is also lost from Lake Campton via evaporation from the lake's water surface. It is unknown to what degree groundwater infiltration or exfiltration may contribute to the lake's water cycle.

**Table 6. Lake Campton morphometric data**

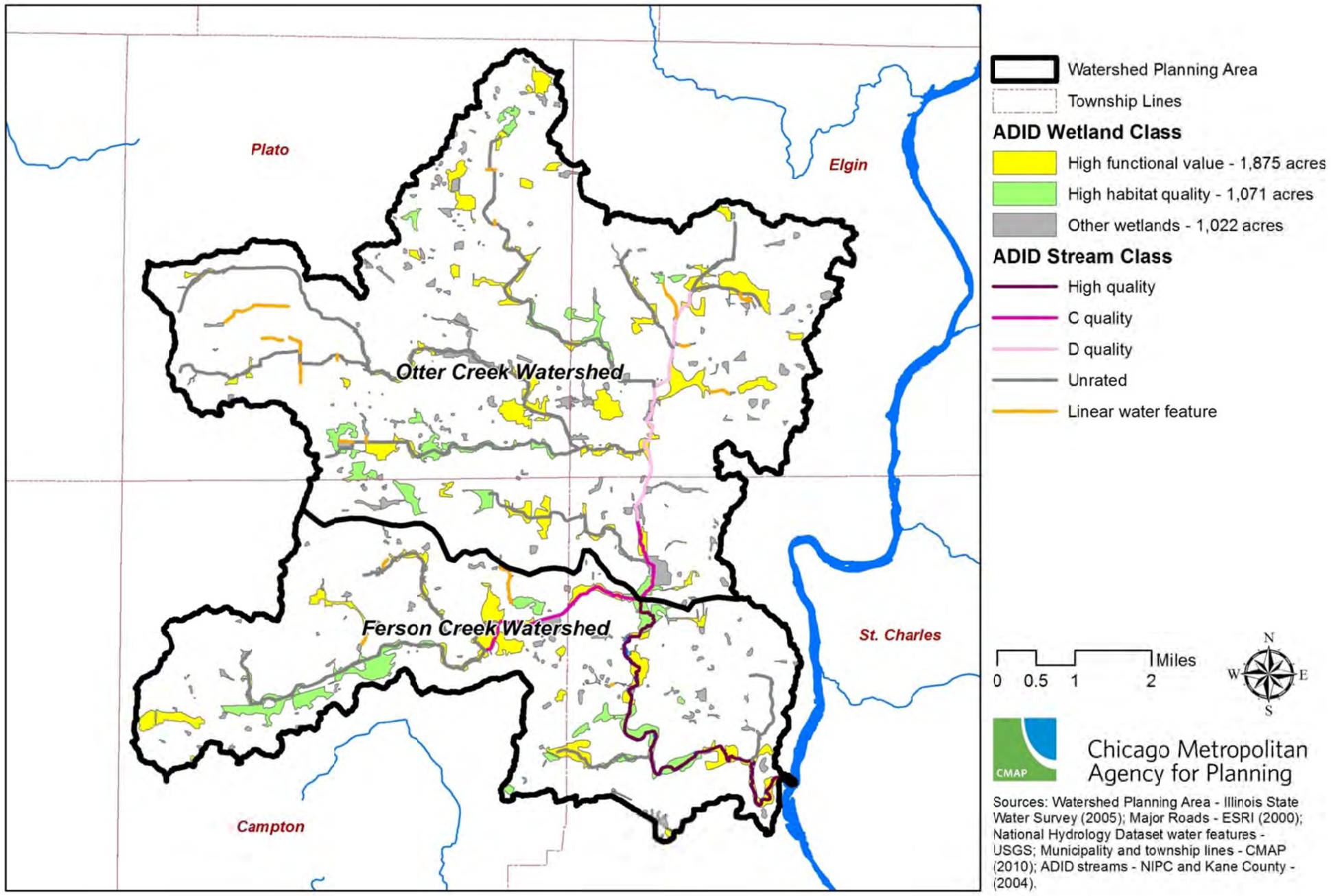
| | |
|---|---|
| Surface Area | 27 acres |
| Maximum Depth | 9 feet |
| Average Depth | 3 feet |
| Volume | 82 acres-feet |
| Shoreline Length | 1.7 miles |
| Maximum Fetch | 2,000 feet E-W |
| Lake Elevation (top of weir) | 810.3 feet |
| Watershed Area | 3,900 acres |
| Average Water Residence Time | 0.03 years |

### *Aquatic Plant Community*

Based on a 1967 Illinois Department of Conservation fisheries survey report along with VLMP observations recorded over the past decade, it appears Lake Campton has experienced extensive nuisance aquatic plant growth (aquatic "weeds") since the lake's creation. Annual aquatic herbicide treatments, accompanied by a weed harvester for a period of years between the mid-1990s and early 2000s, have produced successions of rooted plants, filamentous algae, and phytoplankton. In fact, the 1967 fisheries survey report noted that "Rooted aquatics cover at times up to 75% of the lake area with sago and leafy pondweeds predominating, except in bay area receiving creek where coontail and buttercup and predominated. Filamentous algae is a secondary problem." Similar conditions exist to the present day with the same native aquatic plant species, exacerbated by the addition of an invasive, nonnative aquatic plant, curlyleaf pondweed, which is most abundant in the spring. Small floating plants, duckweed and watermeal, also have become abundant, at times covering more than 50-75% of the lake surface during the summer months.

[74] NIPC, U.S. Fish and Wildlife Service and U.S. EPA. *Advanced Identification (ADID) Study, Kane County, Illinois Final Report*. Chicago, IL: USACE Chicago District, August 2004. http://www.lrc.usace.army.mil/co-r/pdf/KaneADIDReport.pdf (accessed November 7, 2011). It should be noted that methodology used to develop this data resulted in an overestimation of the number of acres of wetland in Kane County. Contact Kane County for more information about the data set.
[75] Ibid.
[76] IDOC Division of Fisheries. *Lake Survey for Campton Lake*. Spring Grove, IL: IDOC Division of Fisheries, 1967.
[77] Ibid.
[78] J. Holley, Lake Campton Property Owners Association, personal communication.
[79] Ibid.
[80] "Illinois StreamStats," USGS, accessed December 12, 2011. http://water.usgs.gov/osw/streamstats/illinois.html.
[81] Measurements performed by H. Hudson using 2010 USGS aerial orthophotography.
[82] Based on Volunteer Lake Monitoring Program data collected 2001–2011.
[83] Thomas Price, Principal Civil Engineer/Hydrologist, Conservation Design Forum, personal communication.
[84] Ibid. 85.

Figure 23. **Wetlands and streams**



### *Fish Community*

Lake Campton was first stocked with sport fish, largemouth bass, in 1954—the year after the lake's creation. In 1963, the lake was rehabilitated and restocked with bluegill along with fingerling and breeder largemouth bass. A 1970 fish survey indicated that these populations remained in good condition, as several size groups indicated annual recruitment.[85] A fisheries survey conducted by a private firm in the 1990s indicated that the fish population was in generally good condition at that time.[86]

More recently, a partial fishkill occurred in late July 2001, apparently associated with extremely low oxygen concentrations (CMAP staff measured dissolved oxygen concentrations on August 13, 2001, at the request of the LCPOA). Several factors converging may have contributed to this situation: the lake was nearly covered with duckweed (limiting sunlight penetration and thus photosynthetic oxygen production by phytoplankton and rooted aquatic plants below, and limiting atmospheric oxygen exchange), water temperatures were very warm (the warmer the water, the less oxygen it can hold), and an aquatic herbicide application had recently occurred (decaying plant materials consume oxygen).

Since that time, no formal fish population survey has been conducted to assess the types, numbers, and year classes of fish present. The LCPOA has stocked some 6-8 inch largemouth bass, and discussions with LCPOA members who frequently fish the lake indicate that bluegill are plentiful and that largemouth bass numbers seem fine.[87]

## 2.2.9 Dams

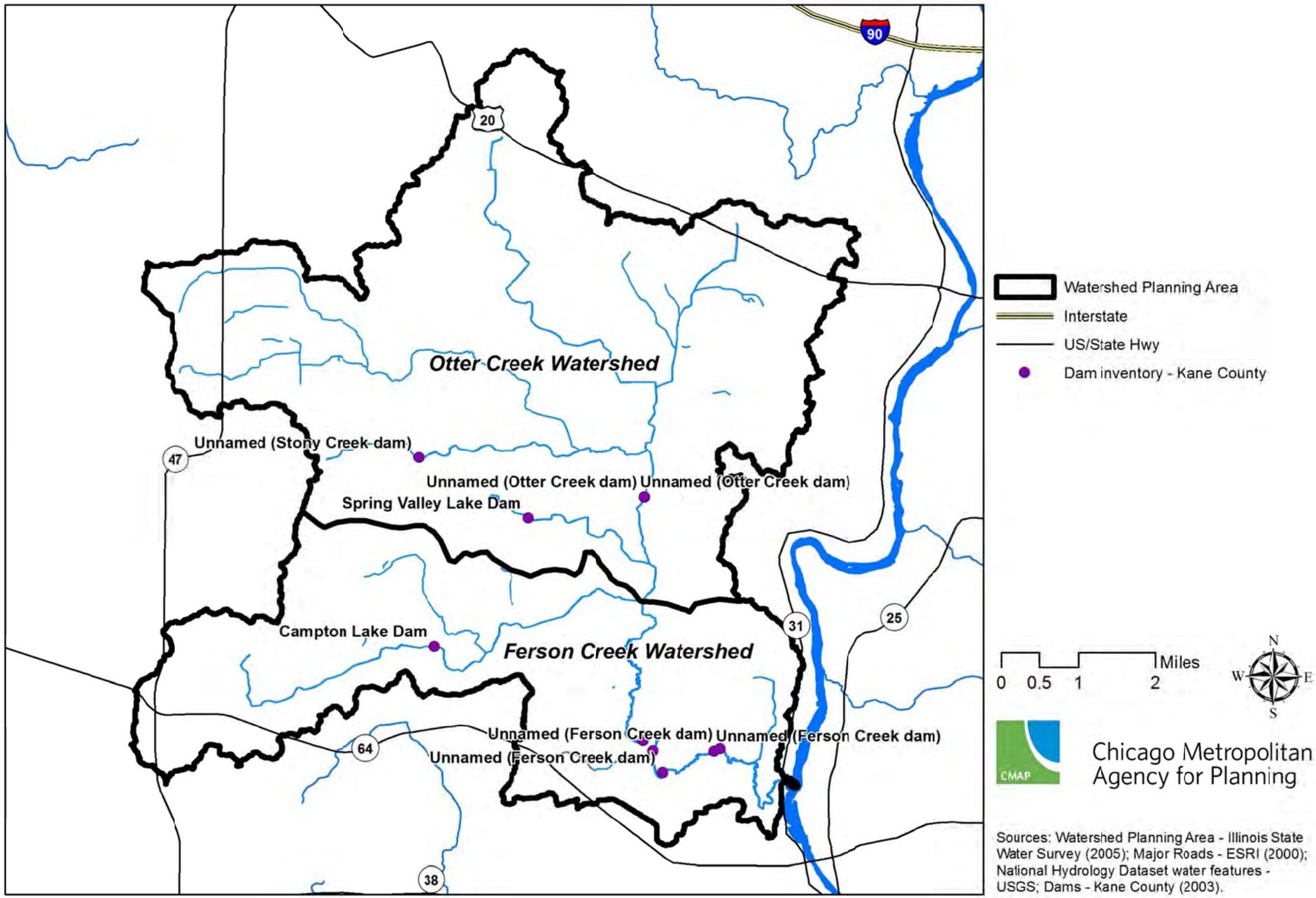
Congress authorized the U.S. Army Corps of Engineers (USACE) to create a nation-wide inventory of dams in 1972. Today, the National Inventory of Dams (the Inventory) is a database maintained by USACE that contains information on dams throughout the nation meeting certain criteria. Dams included in the Inventory are those that meet one or more of the following classifications: they are high hazard (i.e., loss of life is likely in the event of dam failure); significant hazard (i.e., loss of life or damage to property or the environment is possible in the event of dam failure); greater than or equal to 25 feet in height and 15 acre-feet in storage; or greater than or equal to 50 acre-feet in storage and 6 feet in height.[88] All dams meeting these criteria are eligible for inclusion in the Inventory, yet in reality, data collection is subject to financial limitations, particularly for those dams unregulated by state or federal agencies.[89]

Due to security concerns regarding dam hazard information, the Inventory is not available for download by the general public, but can be acquired by government agencies like CMAP. Although Inventory records for dams in the watershed planning area were obtained, USACE has acknowledged reports of error in the geographic coordinates for dams in the state of Illinois.[90] Dam locations were therefore impossible to map for this watershed planning area. The Illinois Department of Natural Resources, Office of Water Resources, which maintains information on dams in the state, is aware of this problem, but with limited funding available for data collection, is not currently able to correct the error.[91] While mapping was not possible, the dimensions and number of dams in the Inventory for Illinois are correct. For this database, there is one dam listed on Ferson Creek in Kane County. Campton Lake Dam is 13 feet in height and 98 acre-feet in storage.[92] There are no dams listed on Otter Creek.

In addition, Kane County staff provided a spatial data layer of county dams. However, this layer was last maintained in 2003 and may contain dams that have since been removed.[93] Figure 24 illustrates 10 dams in the watershed, including Campton Lake Dam, also listed in the National Inventory of Dams.

[85] IDOC Division of Fisheries. *Lake Survey for Campton Lake*. Spring Grove, IL: IDOC Division of Fisheries, 1967.
[86] Wight Consulting Engineers, Inc. *Lake Campton Property Owners Association Engineering Study for Lake Campton Lake Enhancement*. Barrington, IL: Wight Consulting Engineers, Inc., 1994.
[87] J. Holley, Lake Campton Property Owners Association, personal communication.
[88] "CorpsMaps National Inventory of Dams," USACE, last modified January 15, 2009, accessed October 12, 2011, http://geo.usace.army.mil/pgis/f?p=397:1:8757593860658286::NO.
[89] Ibid. 95.
[90] Rebecca Ragon, USACE staff, email message to author(s), August 4, 2011.
[91] Paul Mauer, IDNR Senior Dam Safety Engineer, email message to author(s), August 24, 2011.
[92] USACE. "National Inventory of Dams." Full dataset obtained through non-disclosure agreement between USACE and CMAP, July 22, 2011.
[93] Jason Vertracht, Kane County GIS Analyst, email message to author(s), July 20, 2011.

Figure 24. **Dam locations in Ferson-Otter Creek Watershed**

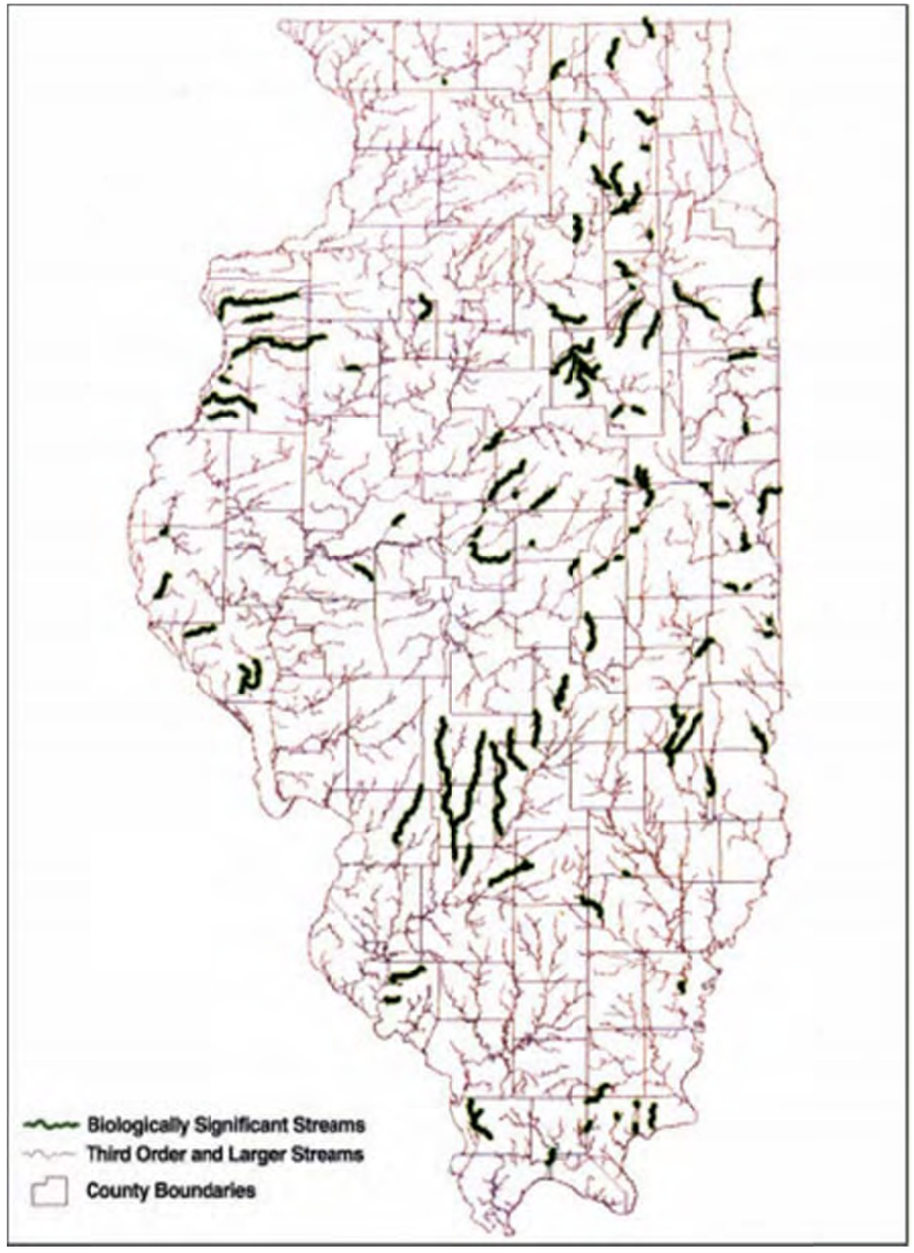


## 2.2.10 Aquatic Biology

This section focuses on IDNR's Biological Stream Ratings for Diversity, Integrity and Significance. The purpose of these ratings is to assess fish and macroinvertebrate communities, water quality, and habitat throughout the major basins of Illinois and among other objectives identify stream segments that exhibit a high potential for resource management or restoration activities and bring awareness to segments that have uncommon aquatic biotic resources.

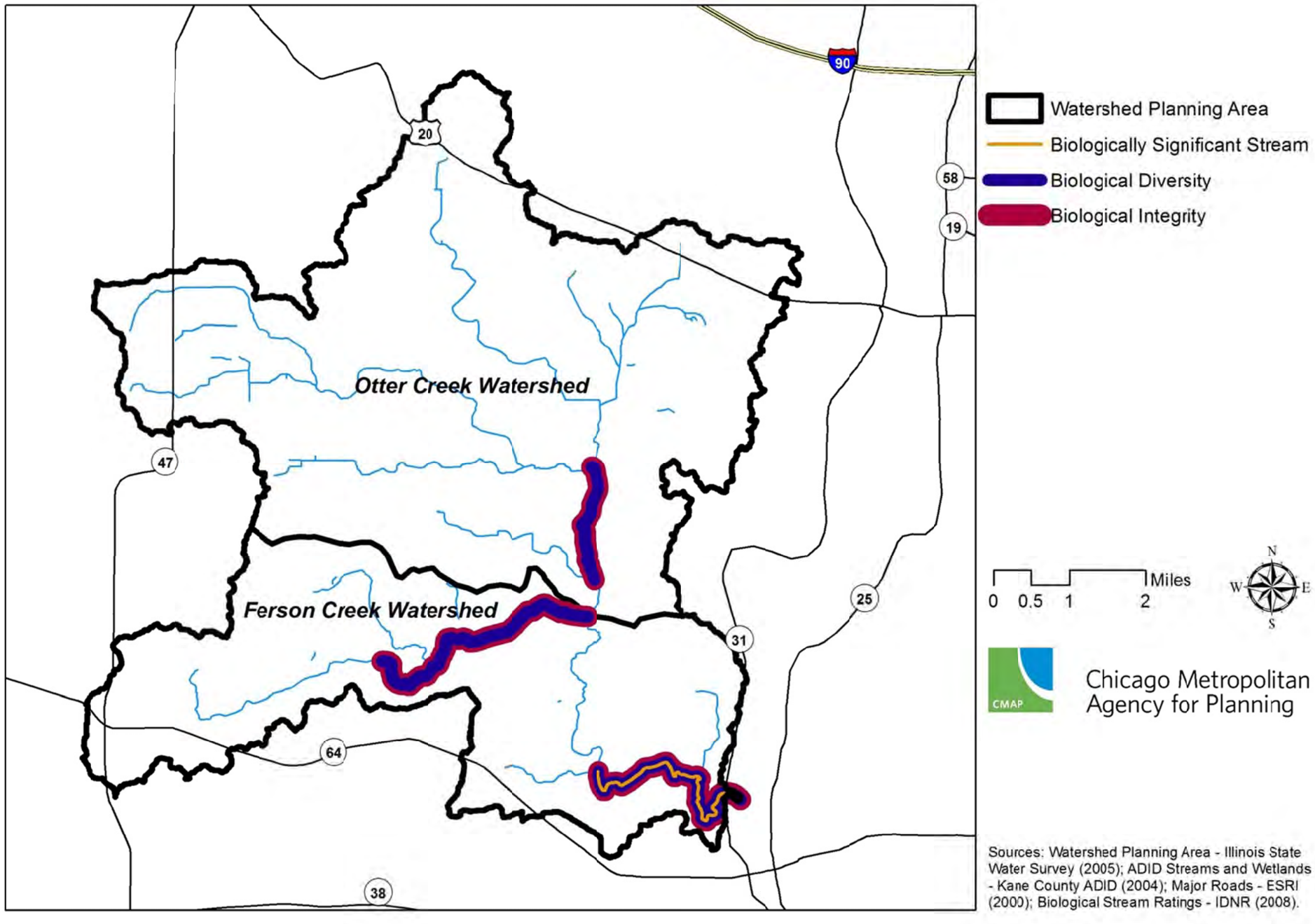
Ratings for Diversity and Integrity are derived from a variety of sources that are then quantified and categorized on a scale from A to E with A being the desired condition. Biologically Significant Streams (BSS) classification is derived from a high rating or score based on data from at least two taxonomic groups. IDNR considers data used to classify both Biotic Diversity and Integrity in the process of identifying BSS. Figure 25 displays all of Illinois' BSS. It should be noted that diversity and integrity are scored separately because it is possible to have a highly intact community (achieve integrity) that is not biological diverse. Data considered for these current ratings were collected from 1997-2006 by IDNR, IEPA, or Illinois Natural History Survey (INHS) monitoring programs.[94] In this watershed, there are three main segments that are identified using these three rating systems- two in Ferson Creek and one in Otter Creek shown in Figure 26. A lengthy stretch of Ferson Creek leading to its mouth at the Fox River is the only stream segment in the planning area that merits a BSS designation. This Ferson Creek BSS is just one of twenty steam segments in the 11-county region that is third order or larger and of this class of highest quality aquatic resource.

**Figure 25. Biologically significant streams in Illinois**




[94] IDNR. *Integrating Multiple Taxa in a Biological Stream Rating System*. Springfield, IL: IDNR, 2008. http://www.dnr.state.il.us/orc/biostrmratings/images/BiologicalStreamRatingReportSept2008.pdf (accessed November 9, 2011).

Figure 26. **Biological stream ratings within Ferson-Otter Creek Watershed**



## 2.2.11 Fish Surveys

Fish are integral members of the watershed community. Fish surveys can serve as a tool to understand current watershed conditions but also can be an indicator of watershed health when data is collected over time. The Ferson-Otter Creek Watershed has had several surveys completed in the recent past. Below are short summaries of selected surveys.

### *Ferson/Otter Creek Biological Survey, IDNR, Division of Fisheries, September 1998*[95]

Illinois Department of Natural Resources (IDNR) collected these data in 1998 with the purpose of establishing a baseline for evaluating management practices and to provide information for restoration efforts in the Ferson-Otter Creek Watershed. Samples were taken at four locations on the major branches of Ferson and Otter Creek to evaluate fish, macroinverbrates, and habitat quality. The Index of Biotic Integrity (IBI), the Macroinvertebrate Biotic Index (MBI), and the Stream Habitat Assessment Procedure (SHAP) were all used as evaluation tools at each sampling location. A combined total of 716 fish collected represent 31 species from the four locations. While the specific scores of each station vary for a variety of reasons, at the time of the survey water quality did not appear to be a limiting factor (based on MBI scores). However habitat quality and connectivity to the Fox River were more of a concern due to land use and channel manipulation. Specific sampling locations and location scores can be found from the original source.

### *2002 Fox River Basin Survey Report, IDNR, Division of Fisheries, Region 2, Streams Program, Published September 2004 by Stephen M. Pescitelli and Robert C. Rung.*[96]

Both IDNR and IEPA surveyed the Fox River Basin as part of a larger statewide monitoring program to measure the health of Illinois streams. Data were collected from the fish community, macroinvertebrates, habitats, and water and sediment sampling. The conclusions of the report include species composition, distribution, and determination of stream quality based on fish community structure. Overall in the Fox River Basin, 10,317 fish representing 63 species were collected in 2002 from the 18 stations. The 2002 individual, species, and species composition were similar to the comparative 1996 study. All species were native except for the common carp.

For this 2002 report, the only sampling station within the watershed was within the Leroy Oaks Forest Preserve (Ferson Creek) in St. Charles.[97] For Ferson Creek specifically, the total fish count was 282 representing 17 species. The top fish counts were Hornyhead Chub (48 fish), Largescale Stoneroller (43 fish), and the Central Stoneroller (38 fish). The Index of Biotic Integrity (IBI) score dropped 4 points from 48 to 44 from 1996 to 2002 but remained in the good resource quality category as indicated in the Draft 2010 Illinois Integrated Water Quality Report and Section 303(d) List. However the Biological Stream Characterization remained the same, "B."

### *Fish Assemblages and Stream Condition in the Fox River Basin: Spatial and Temporal Trends, 1996-2007, IDNR, Division of Fisheries, Region 2, Streams Program, Published April 2009 by Stephen M. Pescitelli and Robert C. Rung.*[98]

This 2007 report builds on the data gathered for the previous Fox River Basin Survey Reports described above. Sixteen stations were added to the 2007 survey when compared to both the 2002 and 1996 surveys, including a station in Otter Creek near Silver Glen Road for a total of 34 stations in the Fox River Basin. Perhaps the additional stations can account for the nearly doubled fish count for the Fox River Basin with a total of 20,285 fish, representing 17 families and 79 species (76 of which are native). For Ferson Creek, the total fish count was 288 representing 18 species. The top fish counts were Hornyhead Chub (71 fish), Central Stoneroller (64 fish), and Bluntnose minnow (57 fish). For Otter Creek, the total fish count was 261 representing 17 species. The top fish counts were Green Sunfish (74 fish), Sand Shiner (47 fish), and Bluntnose minnow (29 fish). The Ferson Creek IBI increased from 44 in 2002 to 48 and Otter Creek reported an IBI of 29.

Overall the IBI scores for the Ferson Creek testing station have been stable throughout the sampling period. More data will need to be collected to track similar trends for Otter Creek. The Table 7 summarizes the Fox River Basin Surveys from 1996-2007. It should be noted that more data is provided in each of these respective full documents.

**Table 7. Fish assemblages and stream condition testing stations in Ferson-Otter Creek Watershed**

| STATION ID AND YEAR | TOTAL FISH COUNT | NUMBER OF SPECIES | IBI SCORE |
|---|---|---|---|
| DTF-02 Ferson Creek-1996 | – | – | 48 |
| DTF-02 Ferson Creek-2002 | 282 | 17 | 44 |
| DTF-02 Ferson Creek-2007 | 288 | 18 | 48 |
| DTFA-02 Otter Creek-1996 | – | – | – |
| DTFA-02 Otter Creek-2002 | – | – | – |
| DTFA-02 Otter Creek-2007 | 261 | 17 | 29 |

"-" Indicates no data available.

## 2.2.12 Stream Assessment

A stream assessment and final report was initiated by the St. Charles Park District and completed in November 2000. The assessment covered four miles of stream channel in various levels of detail and included 24 cross section surveys. The report concluded that Ferson and Otter Creeks "are in a gradual process of channel geometry adjustment in response to changes in flow patterns and volumes." Land use pressures and subsequent alterations to the surface area of the watershed are thought to contribute to these changes. The Ferson-Otter Creek Watershed is experiencing both lateral-changes in channel alignment through bank erosion and vertical migration-changes in the elevation of the longitudinal profile of a given reach or stream. Furthermore the report states that restoration projects should always consider the option of re-connecting the stream system to the adjacent floodplain as a priority. The full report contains additional information including project background, watershed conditions, data collection methods, cross section installations, photographs and recommendations among others.[99]

## 2.2.13 Data Availability Status

CMAP and partners worked together to inform the plan with available data that are relevant to watershed planning. Some requests for information could not be fulfilled due to lack of data. Table 8 summaries the unfulfilled requests.

**Table 8. Data availability status for resource inventory in Ferson-Otter Creek Watershed Plan**

| DATA REQUEST | CURRENT STATUS |
|---|---|
| Depressional storage locations and opportunities | **Data not available** |
| Description of man-made drainage networks (field tiles, storm sewers) | **Data not available** |
| Supplemental Stream assessment(s) | **Data not available** |
| Septic system inspection data | **Data not available** |
| Total length of drainage ditches, length of ditch erosion, length of ditch bed erosion, length of sediment accumulation, length of debris jabs, length of needed buffers | **Data not available** |

[95] IDNR. *Ferson/Otter Creek Biological Survey*, by Stephen M. Pescitelli and Robert C. Rung. Plano, IL: IDNR, Division of Fisheries, September 1998. http://www.ifishillinois.org/science/streams/1998%20Ferson%20-%20Otter%20Creek%20Survey%20Report.pdf (accessed November 9, 2011).

[96] IDNR. *2002 Fox River Basin Survey Report*, by Stephen M. Pescitelli and Robert C. Rung. Plano, IL: IDNR, Division of Fisheries, September 2004. http://www.ifishillinois.org/science/streams/2002%20Fox%20Survey.pdf (accessed November 9, 2011).

[97] The Ferson Creek sampling location (DTF-02) is the same for the 1996, 2002, and 2007 Fox River Basin Surveys.

[98] IDNR, Division of Fisheries. *Fish Assemblages and Stream Condition in the Fox River Basin: Spatial and Temporal Trends, 1996- 2007*, by Stephen M. Pescitelli and Robert C. Rung. Plano, IL: IDNR, Division of Fisheries, 2009. http://www.ifishillinois.org/science/streams/2007%20Fox%20Survey%20Final%20Report.pdf (accessed November 8, 2011).

[99] Prepared for the St. Charles Park District, St. Charles, Illinois. *Ferson/Otter Creek Stream Assessment Report*, by Steven W. Belz, and H. Lee Silvey. St. Charles, IL: St. Charles Park District, November 2000. Contact the St. Charles Park District for more information.

# 3. WATER QUALITY AND MODELING RESULTS

## 3.1 INTEGRATED WATER QUALITY REPORT

The *Illinois Integrated Water Quality Report and Section 303(d) List* (the Report, the List, respectively) comprises a primary source of information on the status of stream, lake, and groundwater health and identifying potential causes and sources of impairment for which watershed planning initiatives can work to address. This document is prepared every two years by the Illinois Environmental Protection Agency (IEPA), with the most recent Report issued in 2010. The basic purpose of the Report is to provide information to the federal government (USEPA) and the citizens of Illinois on the condition of the state's surface and groundwaters. This fulfills requirements of Sections 305(b), 303(d), and 314 of the federal Clean Water Act and the Water Quality Planning and Management regulation at 40 CFR Part 130 for the State of Illinois.[100] The Report seeks to assess the extent to which waterbodies support a set of recognized "designated uses." The designated uses assessed by IEPA for streams and lakes include Aquatic Life, fish consumption, Primary Contact (swimming), secondary contact (boating, fishing), public and food processing water supply, and aesthetic quality. The degree of support of a designated use in a particular stream segment or lake is determined by analyzing various types of information including biological, physiochemical, physical habitat, and toxicity data. For groundwater, the degree of use support is based primarily on chemical monitoring of community water supply wells. The data are compared against specific water quality standards set by the Illinois Pollution Control Board (IPCB) to protect each designated use. IEPA is responsible for developing scientifically based water quality standards and proposing them to the IPCB for adoption into states rules and regulations. While most of Illinois' water quality standards are numeric, some standards (such as temperature) utilize narrative language.

Through their assessment, IEPA determines whether a waterbody falls into one of two use-support levels for each designated use: "Fully Supporting" or "Not Supporting." Fully Supporting means that the designated use is attained; IEPA also refers to this status as "Good" resource quality for that particular designated use. Not Supporting means the designated use is not attained. If a designated use is not attained, the quality of the resource is further determined to be "Fair" or "Poor" depending on the degree to which the use is not attained. Designated uses that are determined to be Not Supporting are called "impaired" uses (Table 9). Any waters found to be not fully supporting of any one of its designated uses are also called impaired and placed on the "303(d) List" of impaired waters. For each impaired use in each assessed waterbody, IEPA attempts to identify potential causes and sources of the impairment.

**Table 9. IEPA designated use support levels description**

| LEVEL OF USE SUPPORT | GENERAL RESOJRCE QUALITY | RELATIONSHIP TO WATER QUALITY STANDARD | IMPAIRED? |
|---|---|---|---|
| Fully Supporting | Good | Meets standard | No |
| Not Supporting | Fair | Does not meet standard | Yes |
| Not Supporting | Poor | Does not meet standard | Yes |

Improving the condition of impaired waters and ultimately removing such waters from the 303(d) List is a main objective of watershed planning efforts like that for the Ferson-Otter Creek Watershed. The following sections summarize the available information from the 2010 Report relevant to these efforts.

[100] IEPA. *Illinois Integrated Water Quality Report and Section 303(d) List - 2010 DRAFT, Volume I: Surface Water*. Springfield, IL: 2010. http://www.epa.state.il.us/water/tmdl/303d-list.html (accessed November 3, 2011). Note: Ferson Creek and Otter Creek are displayed separately in this report.

## 3.2 ASSESSMENTS AND DESIGNATED USES

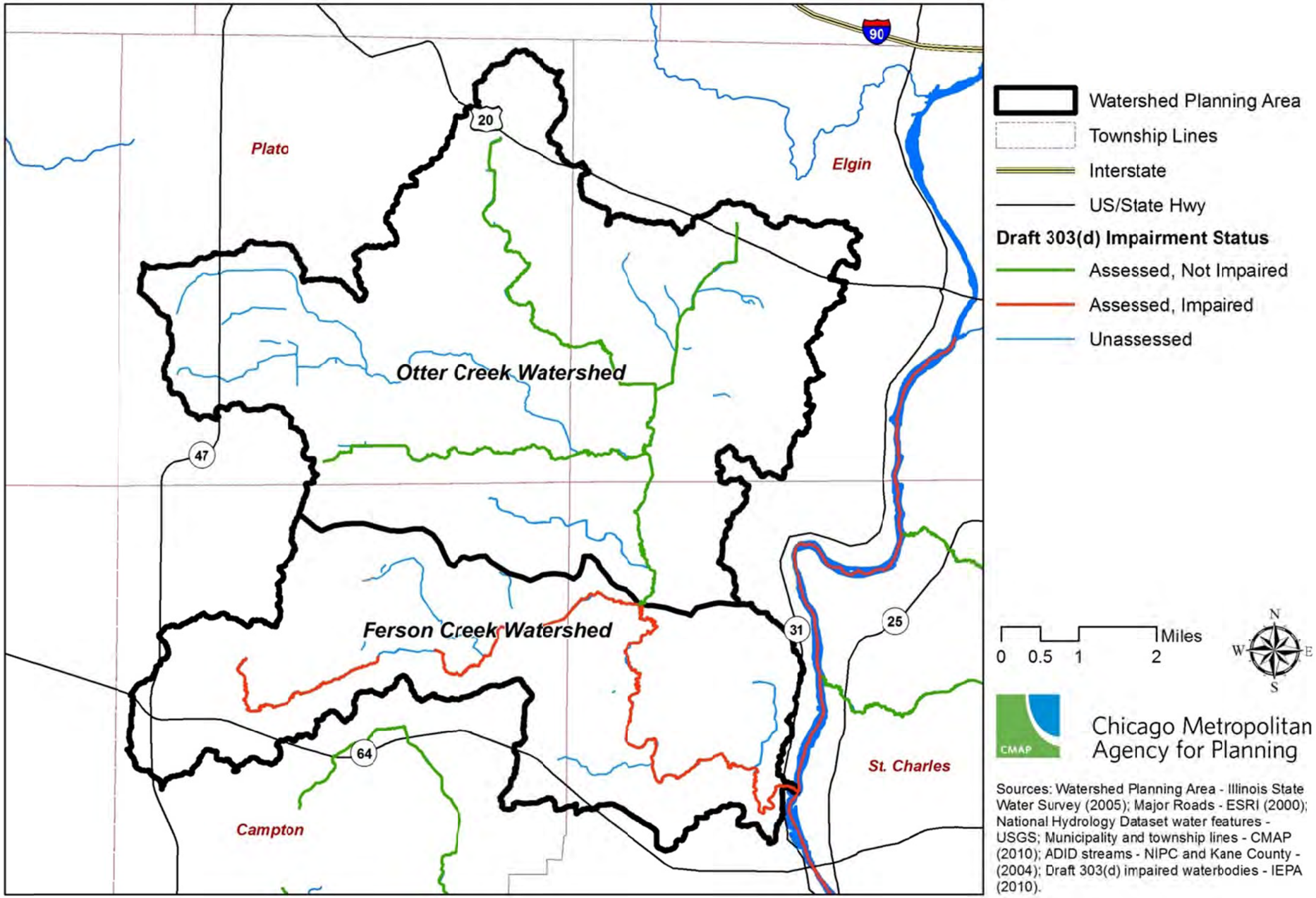
Both Ferson Creek and Otter Creek subwatersheds were assessed in the Report and determined to be Fully Supporting for the Aquatic Life designated use. However, Ferson Creek was also assessed for the Primary Contact designated use, for which it was determined to be Not Supporting. Ferson Creek was not assessed for Secondary Contact, Fish Consumption, or Aesthetic Quality. Otter Creek was not assessed for Primary Contact, Secondary Contact, Fish Consumption or Aesthetic Quality. Therefore, there may be other designated use impairments in the watershed given that assessments have not been performed for all designated uses. See Figure 27 for the water bodies which were assessed and their associated impairment status. Tables 10 summarize the designated uses, assessment status, and impairment status of Ferson and Otter Creek.

Since Ferson Creek and Otter Creek were assessed for Aquatic Life, and also Primary Contact in the case of Ferson Creek, the sections below examine these two designated uses in more detail, including how IEPA defines the designated use, the standard for each and the assessment data with which the impairment determination was made.

**Table 10. IEPA designated use status for Ferson-Otter Creek Watershed**

| DESIGNATED USE: FERSON CREEK | APPLIES TO FERSON CREEK? | ASSESSED IN 2010 IEPA 303(d) LIST? | IMPAIRED? |
|---|---|---|---|
| Aquatic Life | Y | Y | N |
| Fish Consumption | Y | N | – |
| Public & Food Processing Water Supplies | N | – | – |
| **Primary Contact** | **Y** | **Y** | **Y** |
| Secondary Contact | Y | N | – |
| Indigenous Aquatic Life | N | - | – |
| Aesthetic Quality | Y | N | – |
| **DESIGNATED USE: OTTER CREEK** | **APPLIES TO OTTER CREEK?** | **ASSESSED IN 2010 IEPA 303(d) LIST?** | **IMPAIRED?** |
| Aquatic Life | Y | Y | N |
| Fish Consumption | Y | N | – |
| Public & Food Processing Water Supplies | N | – | – |
| Primary Contact | Y | N | – |
| Secondary Contact | Y | N | – |
| Indigenous Aquatic Life | N | – | – |
| Aesthetic Quality | Y | N | – |

Figure 27. **Assessment and Impairment Status for the Ferson-Otter Creek Watershed**



### 3.2.1 Aquatic Life

IEPA relies on biological, water chemical and stream habitat data to determine the extent to which a stream supports Aquatic Life. These data are used to create two indices used in making this assessment. These indices include (1) the fish Index of Biotic Integrity (fIBI), and (2) the Macroinvertebrate Index of Biotic Integrity (mIBI). Table 11 comprehensively states the standards and interpretation information for these indices.

**Table 11. IEPA Aquatic Life standards**

| BIOLOGICAL INDICATOR | | | |
|---|---|---|---|
| Fish Index of Biotic Integrity (fIBI) | fIBI < 20 | 20 < IBI < 41 | fIBI > 41 |
| Macroinvertebrate Index of Biotic Integrity (mIBI) | mIBI < 20.9 | 20.9 < mIBI < 41.8 | mIBI > 41.8 |
| Impairment Status | Severe Impairment | Moderate Impairment | No Impairment |
| Designated Use Support | Not Supporting | Not Supporting | Fully Supporting |
| Resource Quality | Poor | Fair | Good |

The scores for both Ferson Creek and Otter Creek indicate each to be Fully Supporting for the Aquatic Life designated use. Table 12 shows the scores for each watershed from the Report. While Otter Creek shows an fIBI score of 29 indicating a moderate impairment, the combination of these scores still leads to an overall status of Fully Supporting.

### 3.2.2 Primary Contact

Primary Contact as defined by Illinois Water Quality Standards as "any recreational or other water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, such as swimming and water skiing." IEPA primarily uses fecal coliform bacteria data to determine whether or not a stream is supporting this designated use. Fecal coliform is a type of bacteria that is generally found in human and animal feces.[101] The IEPA standard for Fecal Coliform states that "the geometric mean of all fecal coliform bacteria observations (a minimum of five samples over the most recent five year period) collected May through October may not exceed 200 colony forming units per 100 mL OR 10% of all fecal coliform bacteria observed may not exceed 400 colony forming units per 100 mL." Table 13 articulates the standards for the Primary Contact designated use. Fecal coliform data on which the Report's assessment of Ferson Creek and Otter Creek is based was collected by the Illinois State Water Survey (ISWS) at the mouth of Ferson Creek on behalf of the Fox River Study Group over the last 5 years.[102]

**Table 13. IEPA Primary Contact support standards**

| DEGREE OF USE SUPPORT | STANDARDS |
|---|---|
| Fully Supporting (Good) | No exceedances of the fecal coliform bacteria standard in the last five years and the geometric mean of all fecal coliform bacteria observations <200/100 ml, and <10% of all observations exceed 400/100 ml. |
| Not Supporting (Fair) | One exceedance of the fecal coliform bacteria standard in the last five years (when sufficient data is available to assess the standard) OR The geometric mean of all fecal coliform bacteria observations in the last five years <200/100 ml, and >10% of all observations in the last five years exceed 400/100 ml OR the geometric mean of all fecal coliform bacteria observations in the last five years >200/100 ml, and <25% of all observations in the last five years exceed 400/100 ml. |
| Not Supporting (Poor) | More than one exceedance of the fecal coliform bacteria standard in the last five years (when sufficient data is available to assess the standard) OR the geometric mean of all fecal coliform bacteria observations in the last five years >200/100 ml, and >25% of all observations in the last five years exceed 400/100 ml. |

Given these results in Table 14, the Report finds that Ferson Creek is Not Supporting (Poor) for the Primary Contact designated use. A 44% reduction in fecal coliform is needed to meet the geometric mean standard of 200 per 100 ml, while a 71% reduction is required to meet the standard for the percentage of samples over 400 (#/100mL). As stated above, Otter Creek was not assessed for Primary Contact. Ferson-Otter Creek stakeholders have therefore chosen the water-quality standard as the threshold for setting the target pollutant-load reduction.

**Table 12. Aquatic Life Ferson-Otter Creek Watershed data**

| | FERSON CREEK | OTTER CREEK |
|---|---|---|
| Segment ID | IL_DTF-02 | IL_DTFA-02 |
| Biological Indicator | | |
| Fish Index of Biotic Integrity (fIBI) | 48 | 29 |
| Macroinvertebrate Index of Biotic Integrity (mIBI) | 59.1 | 56.5 |
| Impairment Status | No Impairment | No Impairment |
| Designated Use Support | Fully Supporting | Fully Supporting |
| Resource Quality | Good | Good |

**Table 14. ISWS fecal coliform data in reference to state water quality standard**

| WATER QUALITY STANDARD | FLOW WEIGHTED MEAN CONCENTRATION IN FERSON CREEK | IEPA IMPAIRM STANDAR |
|---|---|---|
| Geometric Mean | 355 (#/100mL) | 200 (#/100 |
| % of Samples > 400 (#/100 mL) | 35% | 10% |

[101] "Monitoring and Assessment: Fecal Bacteria," U.S. EPA, last modified June 29, 2011, accessed August 15, 2011, http://water.epa.gov/type/rsl/monitoring/vms511.cfm.
[102] Howard Essig, IEPA, email message to author(s), January 31, 2011. Preliminary monitoring data for the Fox River, collected by Illinois State Water Survey on behalf of Fox River Study Group, 2011.

### 3.2.3 Sources of Fecal Coliform Impairment

While this assessment demonstrates that fecal coliform is a cause of Primary Contact use impairment (and the only known cause of impairment in Ferson Creek), the specific location(s) contributing the most to fecal coliform contamination are unknown. IEPA has identified potential sources of fecal coliform impairment to be urban runoff and storm sewers, and runoff from forests, grasslands and parks. It is important to note that runoff from forests, grasslands and parks contains a naturally-occurring, background level of fecal coliform because wildlife are a component of both natural and man-made landscapes. This plan does not recommend wildlife eradication, although some fecal coliform contamination from wildlife can certainly be prevented. For example, naturalizing detention basins discourages the presence of Canada Geese. Rather the emphasis in this plan is on human-managed fecal coliform sources. For forests, grasslands and parks, this likely means waste which pet owners fail to pick up.

Runoff is the nonpoint source mechanism by which fecal coliform contamination arrives in nearby water bodies. Urban runoff carries fecal coliform and other pollutants, and can be a source of contamination when it empties into storm sewers before it is either discharged untreated into streams or carried to a wastewater treatment facility to be treated and released. The volume of urban runoff is determined by the amount of impervious surface area (e.g., parking lots, rooftops or streets). As impervious surface area increases, runoff from urban areas generally increases, while water quality generally decreases. Water flowing over impervious urban surfaces picks up fecal coliform from pet waste, in addition to a variety of pollutants including oil and toxic chemicals from cars; sediment; road salts; and pesticide and nutrient runoff from lawns and gardens. Similarly, runoff from forests, grasslands and parks can be source of contamination because it carries fecal coliform from pets, livestock or wildlife. Leaking septic systems in both urban and rural areas can also contaminate water with fecal coliform from runoff over locations of failing septic systems. All three of these sources, however—impervious surface cover, forests, grasslands and parks, and areas with failing septic systems—are spatially dispersed throughout the watershed. Given the limited spatial resolution of data collected, IEPA data cannot determine the specific location(s) from which fecal coliform may be entering the stream system.

This plan will include recommendations that address runoff generally and aim to increase stormwater infiltration to limit these sources of current and future fecal coliform contamination. Additionally, this plan will include recommendations to address proper septic system and leach field maintenance to limit potential fecal coliform contamination from leaking septic systems.

### 3.2.4 Water Quality Considerations Beyond Fecal Coliform

In addition to the fecal coliform data used for stream assessment in the Report, ISWS has also collected data in Ferson Creek over the last five years for Total Nitrogen (TN), Total Phosphorus (TP) and Total Suspended Solids (TSS).[103] Data were not collected for the Otter Creek tributary. While total phosphorus, sedimentation/siltation, and total suspended solids are identified causes of impairment in the mainstem Fox River below the mouth of Ferson Creek, neither nutrients nor sediment are implicated as causes of any use impairment within Ferson Creek.[104] Furthermore, the State of Illinois has yet to set water quality standards associated with nutrients in streams and rivers, except for phosphorus at points where streams enter a lake or reservoir greater than twenty surface acres.[105] This particular water quality standard does not apply to Ferson Creek or Otter Creek. However, for water quality parameters for which there are no numeric water quality standards, Illinois does offer statistically-derived guidelines that are used to identify potential use impairment. These guidelines are summarized in Table 15 along with the observed mean concentrations found in Ferson Creek. Given that neither the nutrient concentration nor suspended solids concentration exceeds these guidelines in the watershed, the Ferson-Otter Creek Watershed stakeholders did not set a threshold for acceptable nutrient or sediment concentrations. Establishing target load reductions for nutrients or sediment was, therefore, not necessary at this time. It should be noted that although the Report does not show definitive data pointing to an impairment, nutrients and sediment is still a present stakeholder concern in the watershed, which is affirmed by the plan's short-term project selections in Chapter 4.

**Table 15. Pollutant concentration in Ferson Creek**

| POLLUTANT | FLOW WEIGHTED MEAN CONCENTRATION | STATISTICAL GUIDELINE FOR AQUATIC QUALITY IN ILLINOIS STREAMS |
|---|---|---|
| Total Nitrogen | 2.64 (mg/L) | 7.8 (mg/L) |
| Total Phosphorus | 0.19 (mg/L) | 0.61 (mg/L) |
| Total Suspended Solids | 38.68 (mg/L) | 116 (mg/L) |

## 3.3 LAKE CAMPTON WATER QUALITY DATA

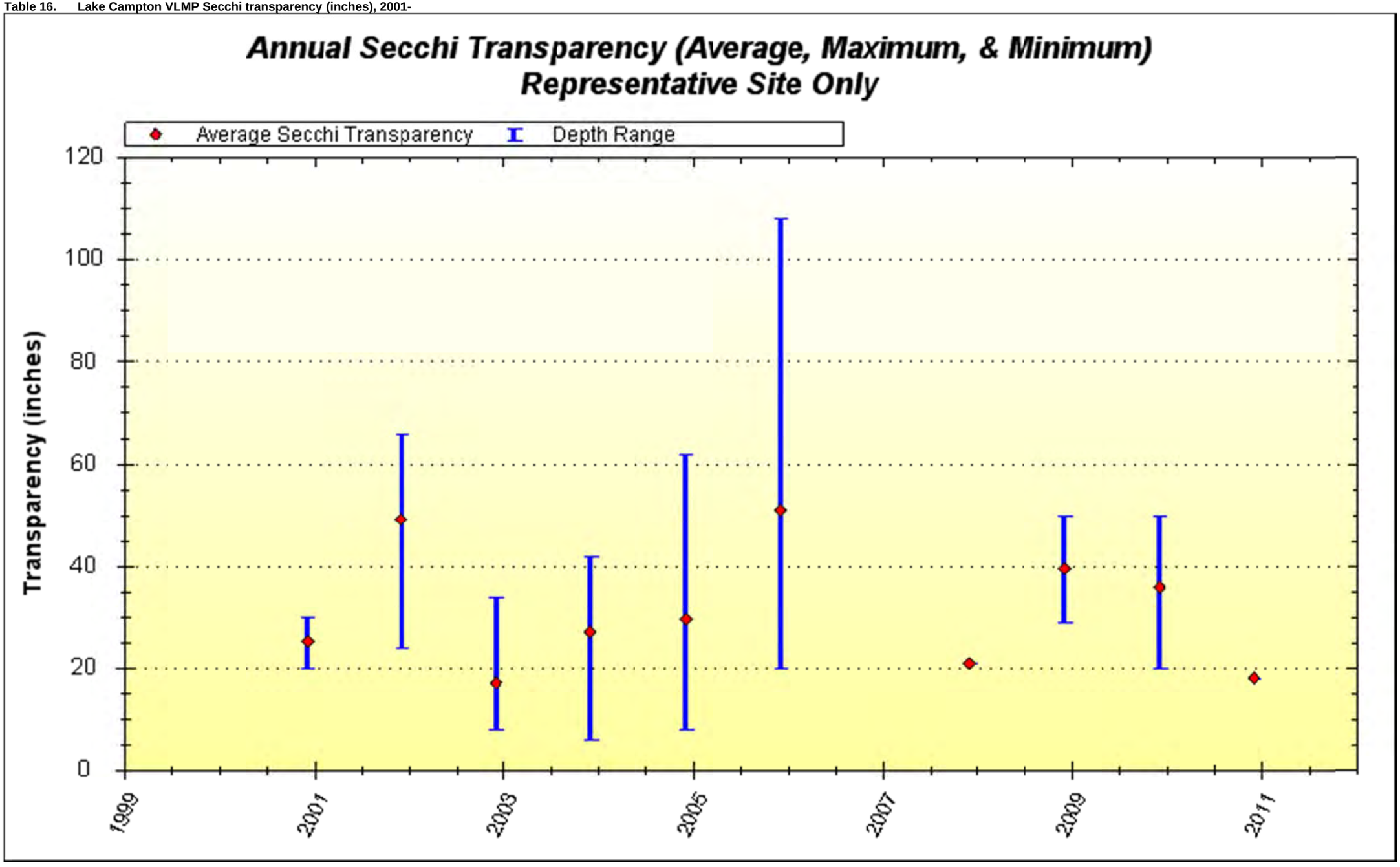
Lake Campton Property Owners Association (LCPOA) residents began participating in IEPA's Volunteer Lake Monitoring Program (VLMP) in 2001, recording water transparency measurements using a Secchi disk. The volunteer monitors also collected water samples in 2002 and 2004. These samples were analyzed at an IEPA laboratory. A summary of the VLMP data follows.

Secchi transparency readings were recorded at three locations in Lake Campton at least four times during the May through October VLMP monitoring season in 2001-2006 and 2010. Table 16 exhibit the average, minimum, and maximum Secchi transparency at Site 1, the lake's representative site, for these years. Water samples also were collected at Site 1 during 2002 and 2004 on a monthly basis, May through October. Figure 28 gives more details on annual Secchi transparency.

Secchi transparency at Site 1 has tended to average between about 2 - 2 ½ feet, although in 2002 and 2006 transparency averaged slightly more than 4 feet, elevated by the increased water clarity during the fall of those years. In fact in 2006, the Secchi disk occasionally could even be seen on the lake bottom at Site 1 in 8½ - 9 feet of water. The lowest transparency readings of around 1 foot and less were recorded after storm events and are associated with high levels of suspended solids carried into the lake from upstream eroding areas and streambanks. The resuspension of soft lake bottom sediments by wind and waves also contributes to the lake's generally low water clarity. Microscopic, planktonic algae further contribute to low Secchi transparency readings, notably in the hotter summer months as supported by the high chlorophyll *a* concentrations.

[103] Howard Essig, IEPA, email message to author(s), January 31, 2011. Preliminary monitoring data for the Fox River, collected by Illinois State Water Survey on behalf of Fox River Study Group, 2011.
[104] IEPA. *Illinois Integrated Water Quality Report and Section 303(d) List - 2010 DRAFT, Volume I: Surface Water*. Springfield, IL: 2010. http://www.epa.state.il.us/water/tmdl/303d-list.html (accessed November 3, 2011).
[105] *Phosphorus*. *Ill. Adm. Code 35*, Subtitle C, Chapter 1, Part 302 Subpart B, Section 205. http://water.epa.gov/scitech/swguidance/standards/wqslibrary/upload/2006_09_05_standards_wqslibrary_il_il_5_c302.pdf (accessed September 7, 2011).

Table 16. Lake Campton VLMP Secchi transparency (inches), 2001-



As summarized in Table 17, Lake Campton is also very nutrient-rich, with plenty of phosphorus and nitrogen available to support nuisance growth of planktonic and filamentous algae. Total phosphorus (TP) concentrations at Lake Campton were high, ranging from 0.086 to 0.704 mg/L, with an average of 0.26 mg/L, over the two sampling years. This is considerably above the 0.05 mg/L General Use Water Quality Standard as well as the 0.03 mg/L level known to contribute to nuisance growth of algae and some aquatic plants.

Inorganic forms of nitrogen (nitrate+nitrite and ammonia nitrogen) may also stimulate algae growth, notably at concentrations in excess of 0.03 mg/L. At Lake Campton, nitrate+nitrite nitrogen ranged from below detection (0.01K) to 3.4 mg/L over the two sampled years, averaging 0.728 mg/L.

Lake Campton is not alone among the many lakes in the state that exceed these phosphorus and nitrogen thresholds. Further, the overall water quality and aquatic plant conditions in Lake Campton are not surprising due to the large watershed above the lake which has and will continue to provide an ongoing source of siltation and nutrients.

***Sedimentation***

Water depth measurements were conducted throughout Lake Campton by the Illinois Department of Conservation (now Department of Natural Resources) fisheries biologist in 1967 (Figure 29) and by Wight Consulting Engineers in 1993 (Figure 30). Using the three VLMP monitoring sites as reference points and the depths measured at each of these points by the VLMP monitors between 1967 and 2010, it appears that in the vicinity of Site 1, water depths have decreased about 1½ - 2 feet, at Site 2 about 2½ - 3 feet, and at Site 3 about 1-2 feet. The overall surface area of the lake also appears to have declined from 30.6 acres in 1967 to about 27 acres today (Table 18). Sediment accumulation over time is evidenced in the northwestern finger of the lake where an approximately 1-acre marshy area has formed.

**Table 17. Lake Campton site 1 summary statistics, 2002 & 2004 water quality data**

| PARAMETER | UNITS | MEAN | MEDIAN | MINIMUM | MAXIMUM | SD | N |
|---|---|---|---|---|---|---|---|
| Total Phosphorus | mg/L | 0.260 | 0.191 | 0.086 | 0.704 | 0.190 | 8 |
| Nitrate+Nitrite Nitrogen | mg/L | 0.728 | 0.085 | 0.01K | 3.400 | 1.171 | 10 |
| Total Suspended Solids | mg/L | 13.000 | 9.000 | 4.000 | 48.000 | 12.000 | 10 |
| Volatile Suspended Solids | mg/L | 8.000 | 7.000 | 2.000 | 13.000 | 3.000 | 10 |
| Chlorophyll a (uncorrected) | ug/L | 28.940 | 11.400 | 4.500 | 66.400 | 25.300 | 5 |
| Chlorophyll a (corrected) | ug/L | 27.510 | 12.500 | 4.650 | 63.000 | 23.470 | 5 |
| Chlorophyll b | ug/L | 4.834 | 1.350 | 1.000 | 18.900 | 7.040 | 5 |
| Chlorophyll c | ug/L | 2.918 | 1.360 | 1.000 | 8.600 | 2.900 | 5 |
| Phaeophytin a | ug/L | 2.284 | 1.310 | 1.000 | 6.160 | 1.970 | 5 |

**Table 18. Lake Campton water depths and surface area, 1967-2010**

| YEAR | WATER DEPTHS (FEET) SITE 1 | SITE 2 | SITE 3 | SURFACE AREA (ACRES) |
|---|---|---|---|---|
| 1967 | 10.0 - 11.0 | 7.0 | 3.0 - 4.0 | 30.6 |
| 1993 | 9.0 - 10.0 | 5.0 - 5.5 | 3.0 - 4.0 | — |
| 2010 | 8.5 - 9.0 | 4.0 - 4.5 | 2.0 - 3.0 | 27.0 |

Figure 29. **Lake Campton water depth soundings, 1967**

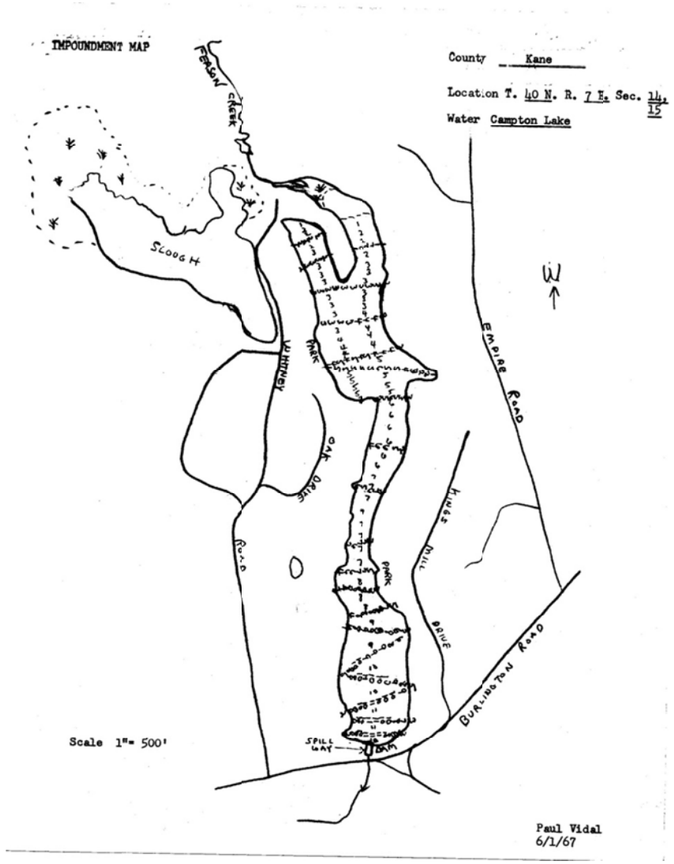
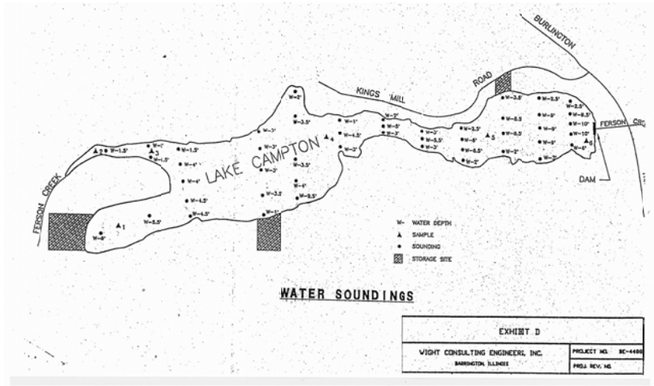
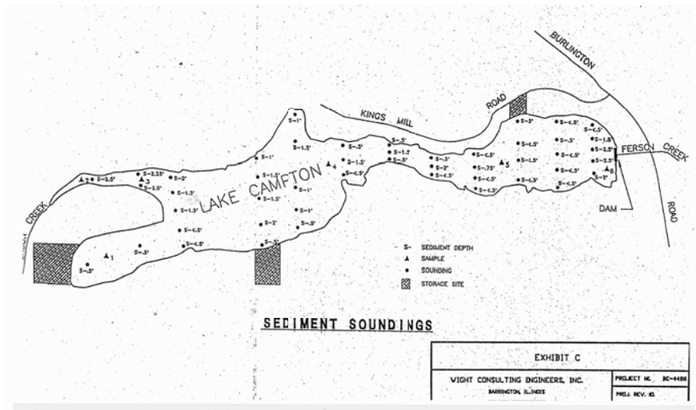



Figure 30. **Lake Campton water and sediment depth sounding, 1993**



## 3.4 GROUNDWATER QUALITY DATA

Groundwater quality data were obtained from IEPA for community water supply (CWS) wells on both sand & gravel and shallow-bedrock aquifers in the Ferson-Otter Creek Watershed.[106] These data reflect raw water samples, collected prior to treatment/distribution by the water supply operator. (Routine operator sampling is most frequently performed only for treated drinking water.) Since the 1980s, IEPA has sampled all CWS wells at least once for baseline raw water quality data, while a subset of 350 wells are sampled every two years as part of the Ambient Monitoring Network.[107]

Table 19 presents the mean concentration, standard deviation, minimum observed value, maximum observed value and number of observations for each inorganic contaminant among all CWS wells in this watershed. This table also lists the Maximum Contaminant Levels (MCL) or Secondary Maximum Contaminant Levels (SMCL) as applies to each contaminant presented here.[108] MCL standards are enforced drinking water regulations, while SMCL standards are recommended levels for preserving aesthetic characteristics of drinking water like appearance, smell, and taste.

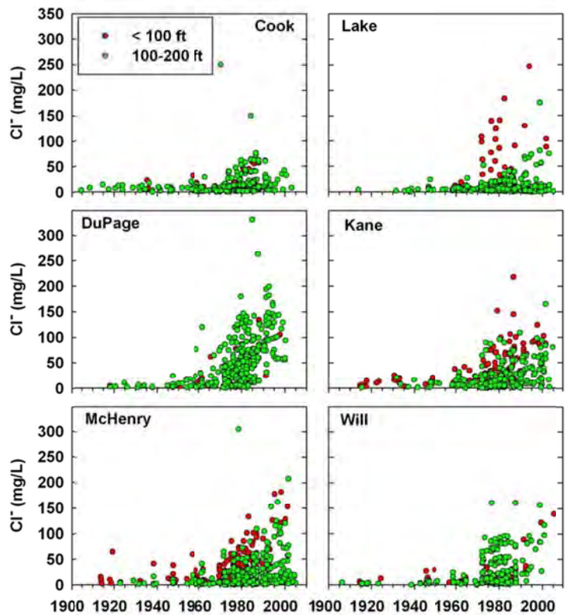
Chlorides in particular have become a groundwater quality concern given a persistent trend of rising chloride concentrations in shallow wells throughout the region.[109] However, chlorides do not pose a threat to human health, although they can impart an undesirable salty taste to drinking water at high levels. Consequently, chloride currently has an SMCL of 250 mg/L (equivalent to parts per million, or ppm).[110] Road salt, septic-system effluent, and water-softener brine waste are major sources of chlorides in urban areas. A recent study found chloride concentrations to be increasing in shallow public wells in the western and southern counties surrounding Chicago. Among shallow public wells in this area, 43% were found to be increasing at a rate greater than 1 mg/L of chloride per year and an additional 15% were found to be increasing at a rate greater than 4 mg/L of chloride per year.[111] Figure 30 from the same study shows mean chloride concentrations for public wells in northeastern Illinois by county for the period 1900 to 2005.[112] The majority of these measurements do not exceed the current SMCL of 250 mg/L, but are much higher than 10 mg/L, the median chloride concentration for Chicago-area wells in 1960.[113,114]

As stated previously, the MCL and SMCL values presented with raw well water sample data in Table 19 are drinking water standards (i.e., finished water for distribution). However, a complex set of water quality standards also apply specifically to in-situ groundwater in Illinois.[115] Groundwater quality data are compared only with drinking water standards in this document (rather than with the more complex groundwater standards) because they are more straightforward, allowing for the abbreviated comparison included here.

IEPA also collects data on organic contaminants. IEPA detected no synthetic organic contaminants (SOCs) or volatile organic contaminants (VOCs) in any of the wells in this watershed planning area.[116] In particular, there were no detections of a special class of VOCs called carcinogenic VOCs (CVOCs). Data presented here for all VOCs are for raw water samples, as for inorganic contaminants above. Unlike for inorganic contaminants, however, finished drinking water samples are likely to have similar VOC levels as raw water samples because conventional water treatment does nothing to remove them. A new law passed in Illinois in 2010, P.A. 96-1366/ SB 3070 or the MCL Prevention Law, oversees concentrations of CVOC's in finished drinking water.[117]

The six CVOC's affected by this law are benzene, carbon tetrachloride, 1,2-dichlorethane, tetrachloroethylene, trichloroethylene and vinyl chloride. The MCL Prevention Law is designed to prevent concentrations of these CVOCs in public water supplies from reaching regulated MCLs. The law requires that if facilities detect one of the CVOCs regulated by this law at a concentration of 50% or more of that CVOC's MCL in finished drinking water, then under certain circumstances, that facility must submit a response plan to prevent exceedence of the MCL, and to lower the concentration of the CVOC below its detectable limit.[118] Compliance with this law is not explored with regard to the sample data in Table 19 for two reasons. First, raw rather than finished water sample data are presented, and the VOC standards do not apply to these raw water samples. Second, even for finished water samples, there is complexity involved in IEPA's interpretation of standards in making a compliance determination.

Figure 31. **Chloride concentrations for public wells in northeastern Illinois at a county level, 1900 to 2000.** [119]




[106] Wade Boring, Manager Geographic Analysis, Illinois Environmental Protection Agency (IEPA), email message to author(s), July 22, 2011.
[107] Ibid.
[108] *Primary Drinking Water Standards*. *Ill. Adm. Code* 35, Part 611. http://www.ipcb.state.il.us/documents/dsweb/Get/Document-27419/ (accessed November 14, 2011).
[109] Kelly, Walter R. "Long-Term Trends in Chloride Concentrations in Shallow Aquifers near Chicago." *Ground Water* Vol. 46, No. 5: (September–October 2008): 772–781.
[110] Ibid. 115.
[111] Ibid. 116.
[112] Figure obtained from Walter R. Kelly, Groundwater Geochemist, Illinois State Water Survey (ISWS), email message to author(s), August 25, 2011.
[113] Ibid. 115.
[114] Ibid. 116.
[115] *Groundwater Quality*. *Ill. Adm. Code* 35, Part 620. http://www.ipcb.state.il.us/documents/dsweb/Get/Document-33425/ (accessed November 14, 2011).
[116] Wade Boring, Manager Geographic Analysis, Illinois Environmental Protection Agency (IEPA), email message to author(s), July 22, 2011.
[117] *EPA—Carcinogenic Compounds*. *Ill. Comp. Stat*. 810 (2010), § 5/1-101.. http://ilga.gov/legislation/BillStatus.asp?DocTypeID=SB&DocNum=3070&GAID=10&SessionID=76&LegID=50631 (accessed September 15, 2011).
[118] Ibid.
[119] Figure obtained from Walter R. Kelly, Groundwater Geochemist, Illinois State Water Survey (ISWS), email message to author(s), August 25, 2011.

**Table 19. Groundwater quality statistics for inorganic contaminants for Ferson-Otter Creek Watershed**

| CONTAMINANT | STANDARD TYPE | STANDARD LEVEL | MEAN | STANDARD DEVIATION | MINIMUM OBSERVATION | MAXIMUM OBSERVATION | NUMBER OF OBSERVATIONS | UNIT |
|---|---|---|---|---|---|---|---|---|
| Antimony | MCL | 6 | 0.00 | 0.00 | 0.00 | 0.00 | 1 | ppb |
| Arsenic | MCL | 10 | 0.00 | 0.00 | 0.00 | 0.00 | 5 | ppb |
| Barium | MCL | 2,000 | 123.20 | 50.86 | 78.00 | 203.00 | 5 | ppb |
| Beryllium | MCL | 4 | 0.00 | 0.00 | 0.00 | 0.00 | 5 | ppb |
| Cadmium | MCL | 5 | 0.00 | 0.00 | 0.00 | 0.00 | 5 | ppb |
| Chloride | SMCL | 250 | 17.66 | 21.06 | 6.80 | 55.30 | 5 | ppm |
| Chromium | MCL | 100 | 0.00 | 0.00 | 0.00 | 0.00 | 5 | ppb |
| Cyanide | MCL | 200 | 0.00 | 0.00 | 0.00 | 0.00 | 5 | ppb |
| Fluoride | MCL | 4,000 | 390.00 | 90.00 | 310.00 | 530.00 | 5 | ppb |
| Iron | SMCL | 300 | 1,278.00 | 360.00 | 930.00 | 1,800.00 | 5 | ppb |
| Manganese | SMCL | 50 | 23.00 | 15.33 | 0.00 | 38.00 | 5 | ppb |
| Mercury | MCL | 2 | 0.004 | 0.009 | 0.00 | 0.02 | 5 | ppb |
| Nickel | No MCL or SMCL | – | 0.00 | 0.00 | 0.00 | 0.00 | 1 | ppb |
| Nitrate | MCL | 10 | 0.00 | 0.00 | 0.00 | 0.00 | 4 | ppm |
| Selenium | MCL | 50 | 0.00 | 0.00 | 0.00 | 0.00 | 5 | ppb |
| Sodium | No MCL or SMCL | – | 12.90 | 7.16 | 7.00 | 23.50 | 5 | ppm |
| Sulfate | SMCL | 250 | 58.72 | 38.25 | 18.60 | 99.00 | 5 | ppm |
| Thallium | MCL | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 1 | ppb |
| Zinc | SMCL | 5,000 | 1.20 | 2.68 | 0.00 | 6.00 | 5 | ppb |

## 3.5 FECAL COLIFORM CRITICAL AREAS ANALYSIS

The preceding discussion has provided an overall characterization of water quality issues in Ferson-Otter Creek Watershed. The following discussion now focuses on critical areas and modeling results at a subwatershed level in the Ferson-Otter Creek Watershed to inform localized plan implementation activities. Critical areas are defined as those subwaters within the watershed for which a source of contamination for a given impairment is present at a concentration relatively higher than that found in the watershed in general.[120] Prioritizing recommended projects and policies for implementation is generally performed according to the financial ability and political will of the implementer, as well as the impact that a given recommendation will have on the ground, likely in that order. By helping to identify areas within a watershed which are thought to generate a disproportionately high pollutant load (critical areas) stakeholders have another tool for prioritizing recommended projects and policies based on the relative need for mitigation throughout the watershed.

While pollutant load reductions demonstrate the mitigation capacity of a particular project or policy, critical areas on the other hand demonstrate those locations within the watershed which are likely most in need of attention. A project or policy could potentially have a large pollutant load reduction, signaling a large impairment mitigation capacity, but might be implemented in an area within the watershed which is relatively unimpaired compared with other subwatersheds. If, however, stakeholders must choose among a larger set of possible project or policy options due to realistic financial or planning constraints, such a scenario might not result in the efficient use of time, money and energy in implementing plan recommendations on the ground. This fecal coliform critical areas analysis is therefore presented as an additional decision-making tool which stakeholders may use to further prioritize projects and policies aimed at mitigating fecal coliform contamination, following those most likely to be successfully implemented in the short term (i.e., within 5 years).

The Fecal Coliform Critical Areas Analysis was performed for Ferson-Otter Creek Watershed given the stakeholder need/choice to establish target load reductions for this impairment. Four potential sources of fecal coliform were considered in this analysis: the amount of urban stormwater runoff, the amount of pet waste, the number of failing septic systems and the presence of manure from livestock agriculture. Unfortunately, specific fecal coliform contamination data related to these sources do not exist at a subwatershed or even watershed level. Therefore, this analysis instead quantifies metrics for proxies that indicate relative levels of likely sources of fecal coliform contamination.

These proxies, quantified at the subwatershed level, include the percent impervious area (a proxy for urban runoff); population density (a proxy for number of pets and therefore amount of pet waste); the number of septic systems (a proxy for number of failing septic systems); and the percent agricultural area (a proxy for fecal coliform from livestock manure). Because this analysis focuses on proxies rather than on observed fecal coliform data, the high, medium and low subwatershed groups for each proxy indicating likely fecal coliform contribution should be taken as a relative rather than an absolute measure. Municipalities in watersheds identified as priorities for fecal coliform through this analysis will be targeted for broader-based policy or ordinance amendments and for public education efforts related to stormwater management and pet waste best practices. In addition, private agricultural landowners who raise livestock can be encouraged to develop comprehensive manure management plans.

Current imperviousness in each subwatershed was determined from the National Land Cover Dataset, which includes an imperviousness component.[121] Cell values in this layer represent the fraction of imperviousness for that cell. This layer was converted to actual impervious area per grid cell by multiplying the fraction of imperviousness of the cell by the area of the cell. The impervious area grid cells were then summed within each subwatershed. Finally, the impervious area in each subwatershed was divided by that subwatershed's total area to calculate percent impervious area. Figure 33 displays the results of this analysis. The Chesapeake Stormwater Network[122] has developed an Impervious Cover Model which correlates impervious cover in a watershed with stream quality in that watershed. As the percent impervious area in a watershed increases, stream quality tends to decrease. Specific thresholds for percent impervious area in each subwatershed area displayed according to this model. The associated recommendations are summarized in Figure 33.

Within Ferson-Otter Creek, three subwatersheds have been identified as nonsupporting watersheds and 8 subwatersheds have been identified has impacted subwatersheds given the relationship established between percentage of impervious cover and water quality (Figure 33). Table 20 identifies the subwatersheds that are nonsupporting or impacted and the municipality that is primarily present within each subwatershed. This analysis leads stakeholders to approach municipalities, Kane County, and other appropriate groups with policy and education and outreach recommendations that focus on these critical areas. These recommendations are reflected in the both the policy and education and outreach section in Chapter 5.

Figure 32. **Impervious cover model guidelines, percent impervious cover**

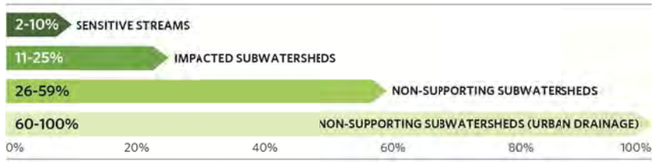
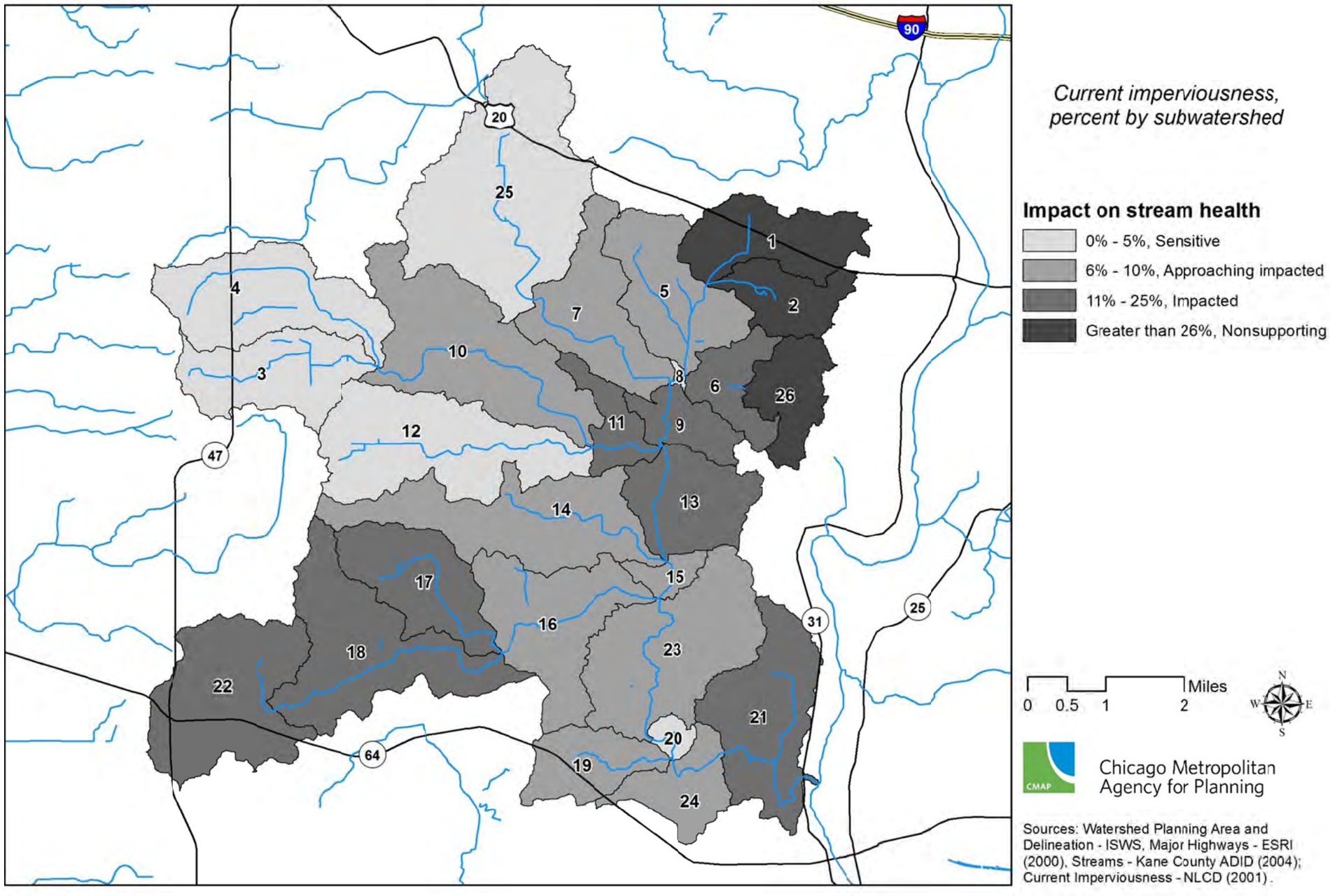



**Table 20. Results of impervious cover model for Ferson-Otter Creek Watershed**

| SUBWATERSHED NUMBER | DESCRIPTION | MUNICIPALITY |
|---|---|---|
| 1 | Nonsupporting Subwatershed | City of Elgin |
| 2 | Nonsupporting Subwatershed | City of Elgin |
| 6 | Impacted Subwatershed | City of Elgin |
| 9 | Impacted Subwatershed | Unincorporated Kane County |
| 11 | Impacted Subwatershed | UnincorporatedKane County |
| 13 | Impacted Subwatershed | Village of South Elgin |
| 17 | Impacted Subwatershed | Village of Campton Hills |
| 18 | Impacted Subwatershed | Village of Campton Hills/ Unincorporated Kane County |
| 21 | Impacted Subwatershed | City of St. Charles/ Unincorporated Kane County |
| 22 | Impacted Subwatershed | Village of Lily Lake/ Unincorporated Kane County |
| 26 | Nonsupporting Subwatershed | City of Elgin |

[120] CMAP and IEPA. *Guidance for Developing Watershed Action Plans in Illinois*. Chicago, IL: CMAP, 2007. http://www.epa.state.il.us/water/watershed/publications/watershed-guidance.pdf (accessed August 15, 2011).
[121] USGS Multi-Resolution Land Characteristics Consortium (MRLC). *National Land Cover Dataset*. Sioux Falls, SD: USGS MRLC, 2001. http://www.mrlc.gov/index.php (accessed August 15, 2011).
[122] Chesapeake Stormwater Network. *The Reformulated Impervious Cover Model: Implications for Stream Classification, Subwatershed Management and Permitting, Version 1.0.* Technical Bulletin No. 3. CSN, 2008. http://www.chesapeakestormwater.net/all-things-stormwater/tag/technical-bulletin (accessed September 15, 2011).

Figure 33. **Current imperviousness percent by subwatershed in Ferson-Otter Creek Watershed**



Future projected imperviousness was also estimated at a subwatershed level using future land use specified in municipal and county comprehensive planning maps. Comparing current and projected future imperviousness indicated areas within the watershed that might be most vulnerable to water quality impacts from increasing impervious surface area and urban runoff. Municipal and county comprehensive planning maps were georeferenced in ArcGIS (Geographic Information System) to enable digitizing. Comprehensive plans used in this analysis include those from Campton Hills, Elgin, South Elgin, St. Charles and Kane County.[123] All developed land uses—those excluding open space, agriculture, agricultural residential and water bodies—were digitized and assigned to one of seven simplified land use categories for this analysis. These land use categories were then associated with a fraction of impervious surface area.[124] See Table 21 for land use categories and impervious runoff coefficients used in this analysis. Given ambiguity among comprehensive plans regarding precise definitions of low and medium density residential housing, the average of the coefficients for low and medium density residential land uses was calculated and applied to both of these land use types.

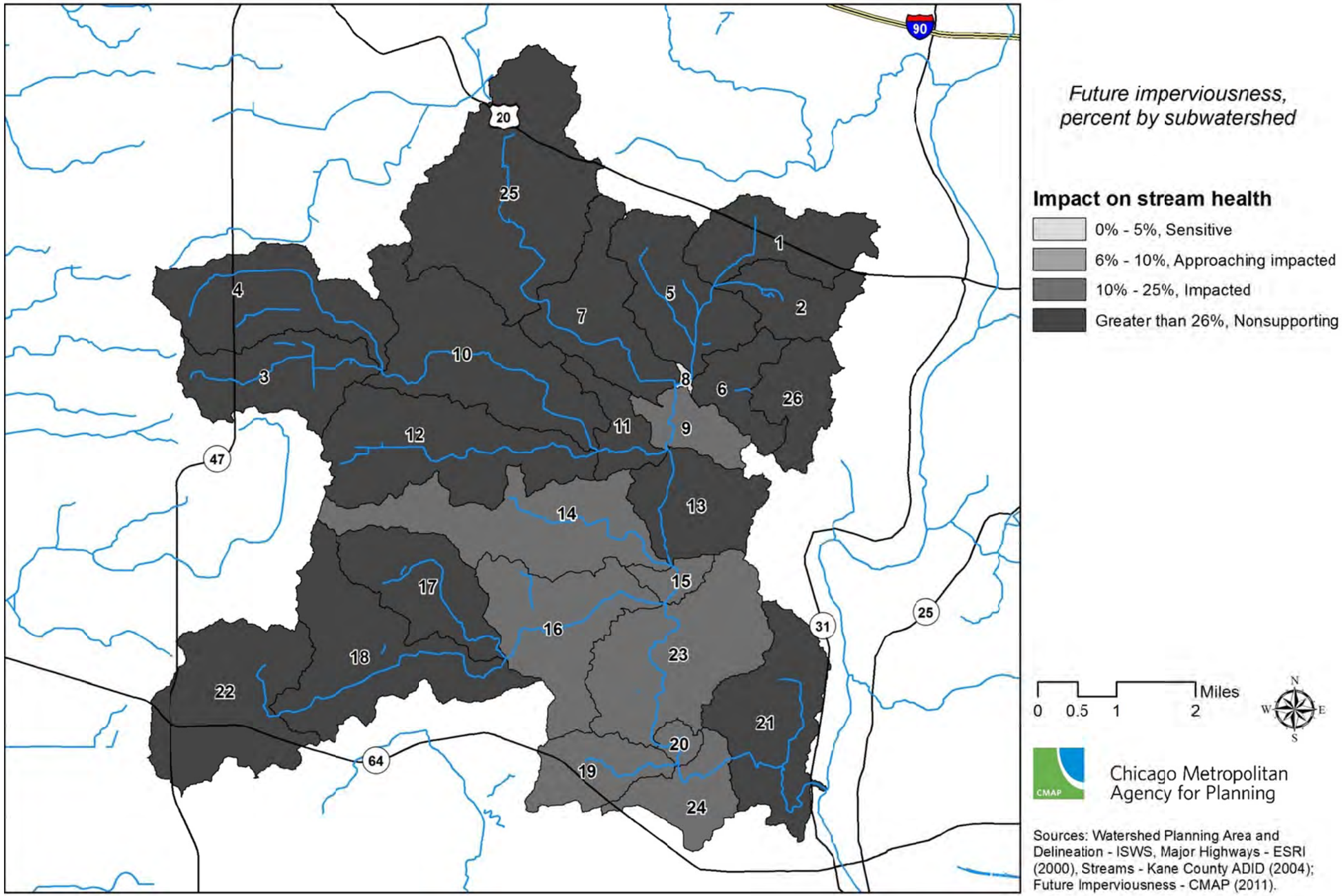
The digitized future land use features were then clipped to the watershed boundary and intersected with the watershed's subwatersheds. Once intersected, the fraction of impervious land cover could be multiplied by the area for each of the digitized future land use features within each subwatershed to give the actual impervious land cover for that future land use feature. The areas of impervious land cover for each of these features was then summed within each subwatershed and divided by that subwatershed's total area to give the percent. Figure 34 displays the results of the projected imperviousness analysis.

**Table 21. Land use categories and associated fraction of impervious cover used in plan analysis**

| LAND USE | FRACTION IMPERVIOUS LAND COVER |
|---|---|
| Low density residential | 0.285 |
| Medium density residential | 0.285 |
| High density residential | 0.514 |
| Commercial | 0.562 |
| Office/industrial park | 0.659 |
| Institutional | 0.280 |
| Industrial | 0.759 |

[123] It should be noted that the anticipated maximum buildout areas for each comprehensive plan were not adjusted for the varying planning horizons. Additionally many of the comprehensive plan land areas overlapped boundaries with other neighboring comprehensive plans.
[124] Wayne County, MI, Rouge Program Office. *Determination of Impervious Area and Directly Connected Impervious Area*, by Ed Kluitenberg. Wayne County, MI: Rouge Program Office, 1994. www.rougeriver.com/pdfs/modeling/RPO-MOD-SR35.pdf (accessed August 9, 2011).

Figure 34. **Future imperviousness, percent by subwatershed in Ferson-Otter Creek Watershed**



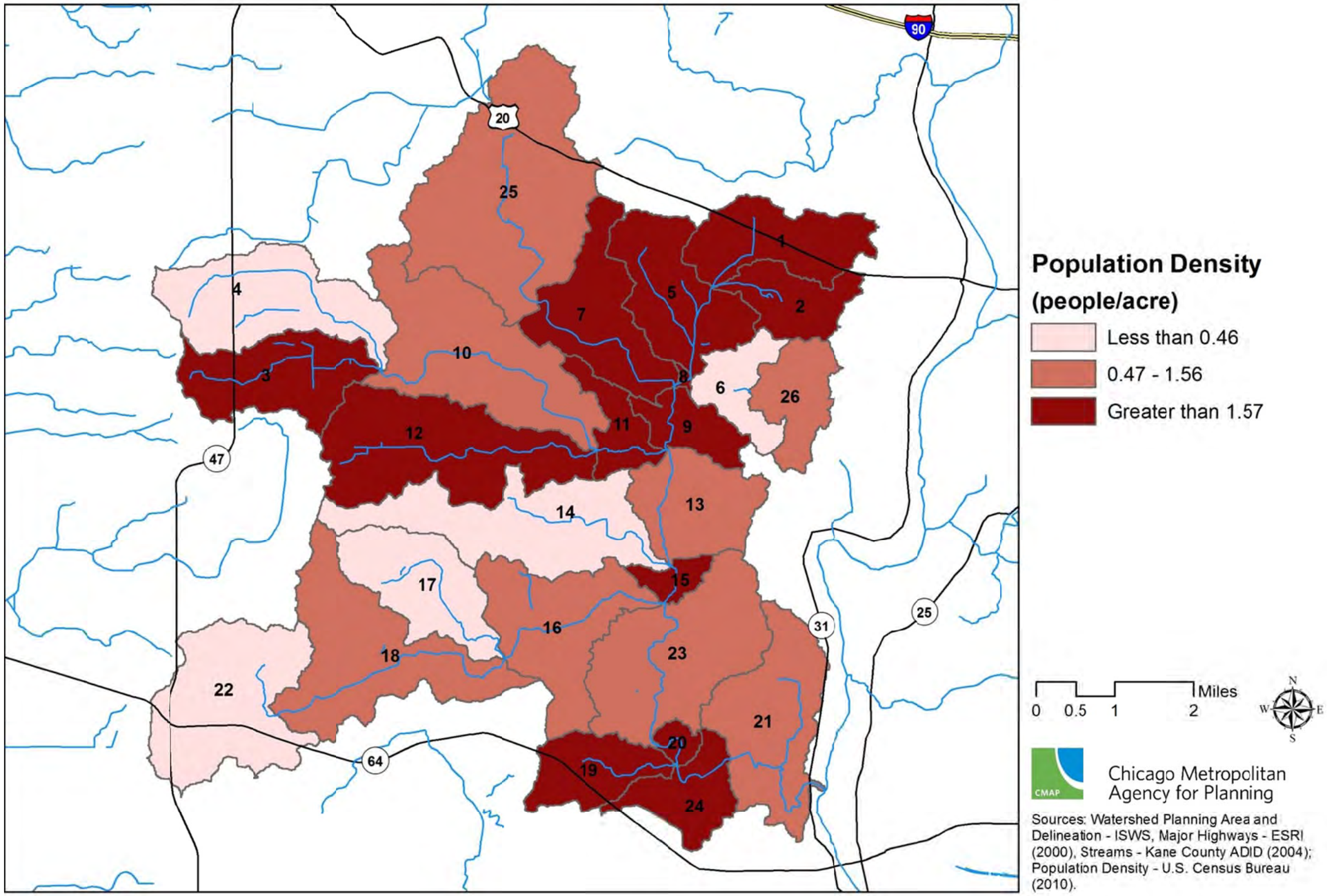
From this figure, it is clear that imperviousness is projected to increase by some amount in all subwatersheds. As previously stated, the analysis of current imperviousness leads stakeholders to approach municipalities, Kane County, and other appropriate groups with policy and education and outreach recommendations that focus on impacts to water quality from imperviousness, as well as stormwater management. Adoption of these recommendations would not only improve management of these impacts in the present, but would also better position Kane County and these municipalities for managing impacts to water quality from imperviousness that will emerge as urbanization increases in the watershed planning area.

As noted, pet waste was also considered as a potential source of fecal coliform. While there is a national pet ownership dataset for the United States, there are no subwatershed, watershed, county or state level datasets on pet populations.[125] Population data for 2010 from the U.S. Census Bureau were used to calculate human population density in each subwatershed, based on the assumption that pet population density scales proportionally with human population density.[126] The importance of urbanization to stream health has been investigated previously, and broadly supports the assumption for this analysis that urban areas contribute a significant amount of fecal coliform to water bodies receiving urban runoff. In addition to impacts from the amount of impervious area, higher population densities are correlated to the potentially lower quality of stream aquatic health, of which fecal coliform concentrations are one determinant. For example, one study found lower values for the Index of Biotic Integrity (IBI) in urban areas when compared with rural areas, indicating that urban areas tend to be associated more often with lower stream aquatic health, an impact caused in part by fecal coliform contamination.[127,128]

Figure 35 displays the results of this analysis. Dreher defines population density thresholds for rural (fewer than 0.46 people/acre), urbanizing (0.46 to 1.56 people/acre) and urban (more than 1.56 people/acre) watersheds.[129] Adopting Dreher's thresholds, there are 12 urban subwatersheds within Ferson-Otter Creek Watershed with the highest population densities. These subwatersheds likely have relatively higher pet populations given our assumption that pet population scales with human population. Beyond this assumption, these population density thresholds do not allow us any definitive conclusions about fecal coliform contamination directly, but rather suggest that the urban watersheds contribute more pollution to runoff from all sources, possibly including fecal coliform. Subwatersheds showing the highest population densities encompass primarily the City of Elgin and unincorporated areas, and to a lesser extent, parts of the Village of Campton Hills.

[125] "U.S. Pet Ownership & Demographics Sourcebook," AVMA, accessed September 15, 2011, http://www.avma.org/reference/marketstats/sourcebook.asp.
[126] Bureau of the Census. "2010 Census Summary File 1." *2010 Census*, Kane and Kendall Counties, Illinois. Washington, D.C.: Bureau of the Census, 2011.
http://www2.census.gov/census_2010/04-Summary_File_1 (accessed November 3, 2011).
[127] Dreher, Dennis W. "Watershed Urbanization Impacts on Stream Quality in Northeastern Illinois." In *Assessing the Cumulative Impacts of Watershed Development on Aquatic Ecosystems and Water Quality*. Chicago, IL: Northeastern Illinois Planning Commission, 1996.
[128] Fitzpatrick, F.A., M.A. Harris , T.L. Arnold , and K.D. Richards. "Urbanization Influences on Aquatic Communities in Northeastern Illinois Streams." *Journal of the American Water Resources Association (JAWRA)*, Vol. 40, No. 2 (2000): 461-475.
[129] Ibid. 134.

Figure 35. **Population density critical areas.**



A septic system analysis was also completed on the subwatershed level. Kane County staff provided an estimate of the number of parcels serviced by septic systems.[130] This estimate was calculated from a Kane County Health Department inventory of subdivisions that are on septic within the watershed. In addition, all land parcels that fell within a sanitary district were assumed to be sewered rather than on septic. Likewise, all land parcels that fall within municipal boundaries that provide sewer service were assumed to be sewered rather than on septic. All remaining parcels were assumed to be on septic. These statistics were then summarized at a subwatershed level to identify areas with high septic system density. While only failing septic systems are a possible source of fecal coliform contamination, we assume a uniform system failure rate throughout the watershed. Therefore, areas with a higher density of septic systems overall are also likely to have a higher density of failing septic systems as well. As Figure 36 shows, the majority of the watershed is determined by this analysis to use septic systems rather than municipal sewers. The subwatersheds that are identified as high priority encompass primarily unincorporated areas, the Village of Campton Hills and the Village of Lily Lake. See Chapter 5 for associated policy recommendations.

Finally, agricultural runoff from livestock and horse manure was considered as a possible source of fecal coliform. Agricultural areas used for livestock and equestrian purposes were identified from the 2005 CMAP Land Use Inventory.[131] (See Resource Inventory for the location of all agricultural land use in Ferson-Otter Creek Watershed.) These areas were summed within each subwatershed and then divided by the total subwatershed area to calculate the percent of livestock and equestrian agricultural area. Figure 37 shows the percent agricultural land use for livestock and equestrian purposes. Two subwatersheds were identified to have more than 5% livestock and equestrian agricultural land use. These subwatersheds encompass primarily unincorporated areas and the Village of Campton Hills. See Chapter 5 for associated policy recommendations.

[130] Sean Glowacz, Land Use Planner for Kane County, email message to CMAP, April 29, 2011.
[131] NIPC. *Land Use Inventory*. Chicago, IL: CMAP, 2005. http://www.cmap.illinois.gov/land-use-inventory (accessed September 14, 2011).

Figure 36. **Septic System Critical Areas**

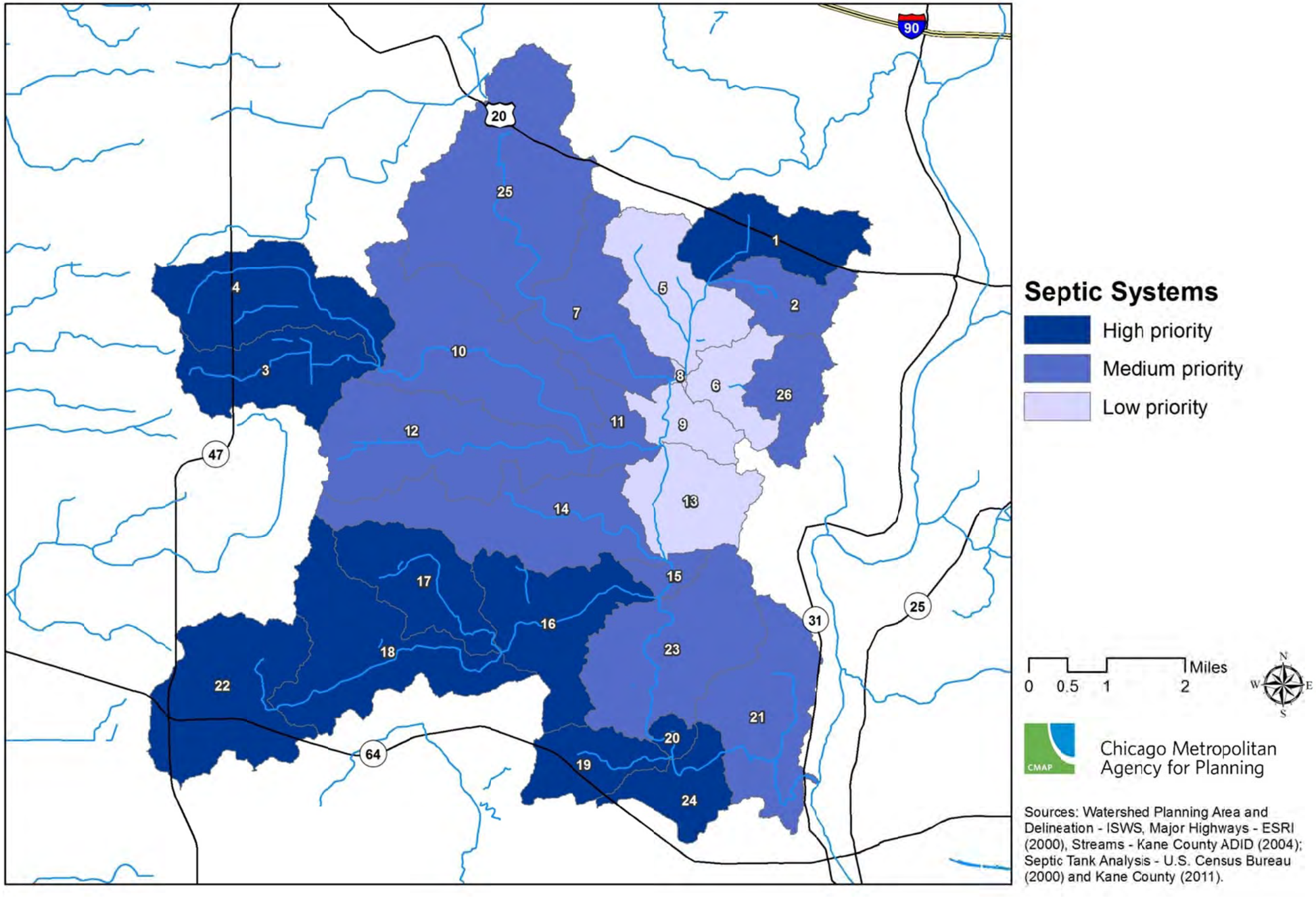
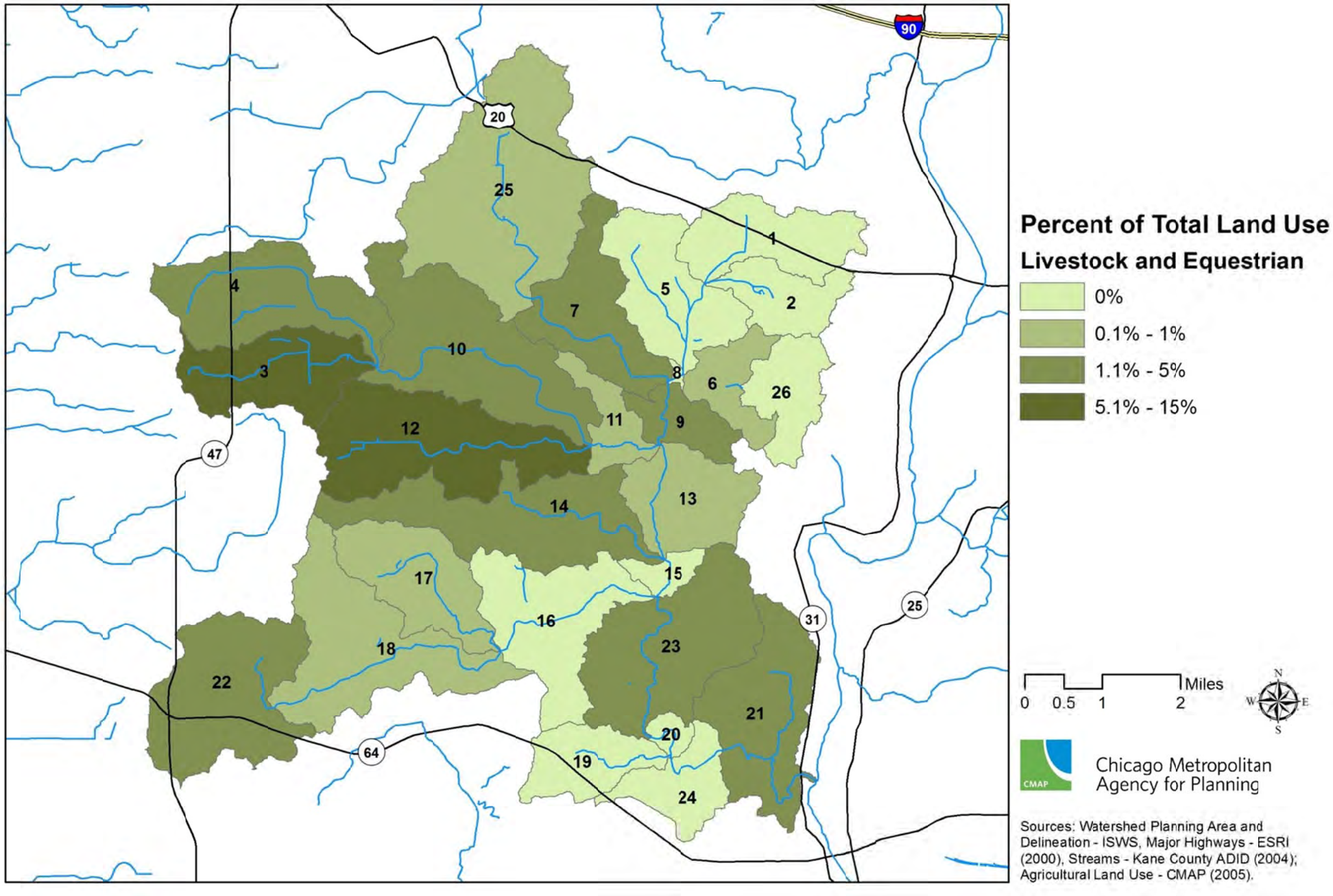


Figure 37. **Percent of Total Land use-livestock and equestrian critical areas**



### *Modeling Results*

A Long-Term Hydrologic Impact Analysis (L-THIA) model was run at a subwatershed level for Ferson-Otter Creek Watershed. L-THIA predicts runoff volume, runoff depth, and nonpoint-source pollutant loadings based on the land use and the hydrologic soil group on which this land use is occurring. L-THIA uses observed, long-term climate data at a county level to model precipitation events. Nonpoint-source pollutants modeled by L-THIA include Total Nitrogen (TN), Total Phosphorus (TP), Total Suspended Solids (TSS) and Fecal Coliform. L-THIA estimates runoff volume and nonpoint-source pollutant loadings based on Event Mean Concentrations (EMC) specific to unique combinations of land uses and pollutant types.[132] EMC values are determined by taking water quality measurements at various points in time during a runoff event, and averaging these measurements by the flow rates corresponding to the sample concentrations. The default EMC values used in the L-THIA model are based on a study by the Texas Natural Resource Conservation Commission.[133] L-THIA uses EMC values to calculate total annual pollutant loadings by multiplying the total annual runoff depth for a land use by the area of that land use, as well as by the appropriate EMC value and converting units when necessary.[134]

Model results are useful because they can help to identify potential sources of impairments. L-THIA results for fecal coliform concentrations among the subwatersheds in Ferson-Otter Creek might provide insight when compared with the results of the fecal coliform critical areas analysis, for example, if an area modeled to have high fecal coliform is also identified as a fecal coliform critical area based on the proxies investigated. Although nutrient and sediment concentrations in Ferson Creek were found to be below the respective Illinois guideline concentrations for streams, the L-THIA results similarly help to present a comprehensive view of water quality issues throughout the Ferson-Otter Creek Watershed. Nutrient and sediment concentrations were collected at a point in Ferson Creek that captures runoff from the entire (combined) watershed(s). Otter Creek was not similarly sampled as an isolated tributary to Ferson Creek. While water quality conditions are potentially similar in Otter Creek, model results offer one way to investigate this premise.

To assess relative contributions of pollutants among the 26 subwatersheds in Ferson-Otter Creek, average annual loadings from L-THIA are converted to unit-area loads, meaning that the total load for each pollutant is divided by the subwatershed area to calculate pounds of pollutant per acre. Unit area loads provide a more meaningful point of comparison than average annual loads because they account for varying area size among subwatersheds. Larger subwatersheds are expected to contribute more pollutants overall as a function of their greater area, but if the unit area load for a subwatershed is still larger than others after dividing by its area, then that subwatershed's pollutant contribution is assumed to be disproportionately large. Figure 38 shows unit area loads for fecal coliform by subwatershed within Ferson-Otter Creek.

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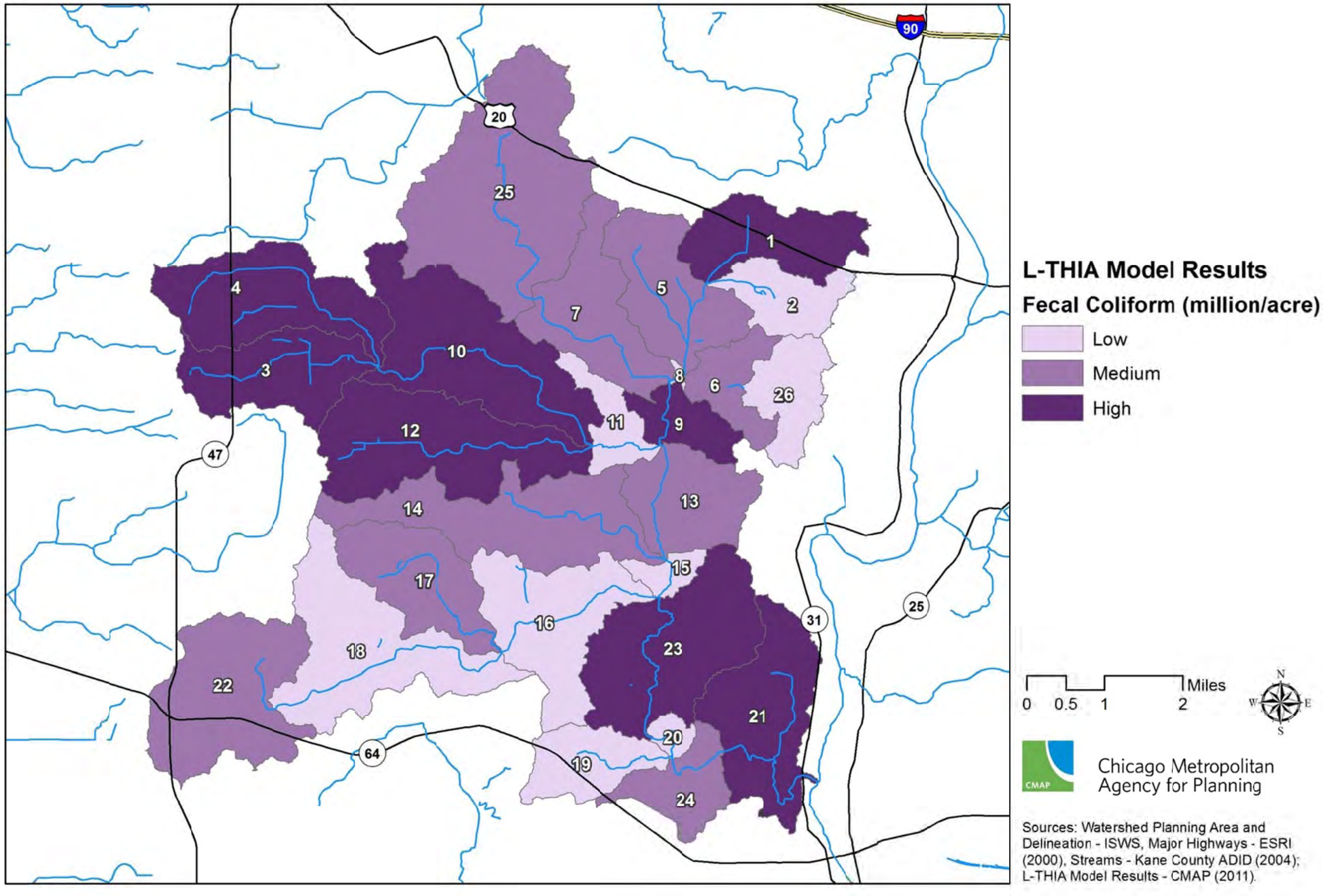
[132] "How L-THIA Estimate[s] NPS Pollutant Loadings using Event Mean Concentration," Purdue University, accessed November 7, 2011, https://engineering.purdue.edu/mapserve/LTHIA7/lthianew/documnt/how_lthia_estimate_nps_using_emc.htm.
[133] Texas Natural Resource Conservation Commission. *Characterization of Nonpoint Sources and Loadings to the Corpus Christi Bay National Estuary Program Study Area*, by Charles Baird and Marshall Jennings. Report No. CCBNEP-05. Corpus Christi, TX: Texas Natural Resource Conservation Commission, 1996. http://www.cbbep.org/publications/virtuallibrary/ccbnep05.pdf (accessed August 15, 2011).
[134] Ibid.

Figure 38. **L-Thia Model Results**



This figure can be compared qualitatively with the critical areas identified through the previous analysis to assess which sources of fecal coliform contamination might be most likely in this watershed-based on the geographic overlap of likely sources (critical areas) with likely high unit area loads (L-THIA results). While some fecal coliform likely does originate from all sources discussed in this plan, the subwatersheds in this map with the highest unit area loads reflect the critical areas for the pet waste, agricultural waste and septic system leakage proxies to a greater extent than for the urban runoff proxy, suggesting that pet waste, agricultural waste and failing septic systems might contribute more to fecal coliform contamination in this watershed than urban runoff.

The results for fecal coliform are conservative, since the L-THIA model likely underestimates fecal coliform loading. Fecal coliform loading is calculated using an EMC, as are loadings of the other non-point source compounds; that is, a constant in units of bacteria per volume is multiplied by the total volume of water passing over a particular land use. As such, the loadings modeled by L-THIA constitute only nonpoint sources of contamination, including those for fecal coliform. The L-THIA model employed here uses minimum EMC values for fecal coliform that are derived from the existing literature. Therefore, model outputs will be low compared to other forms of estimation that use maximums or averages.[135] For purposes of this plan, the nonpoint source component of fecal coliform contamination is more relevant, since wastewater treatment plant point sources must disinfect effluent during the period when sample counts determine a stream's use attainment or impairment status.

Nitrogen, phosphorus or sediment pollutants are displayed spatially in the aggregate. Bundling these pollutants is intuitive because they likely share a common source. For example, agricultural land uses, and nonnative turf-grass lawns in urban areas, can lead to disproportionately large loadings of all three of these pollutants. If a subwatershed has a high nitrogen unit area load, it likely also has high phosphorus and sediment unit area loads. Therefore only one map is displayed rather than three. The method for aggregating these metrics is detailed below and is similar to the general process employed in identifying critical areas above. This method has been applied to bundle factors contributing to water quality in other watershed planning documents as well.[136,137]

To view TN, TP and TSS in the aggregate, each subwatershed receives three scores, one for each pollutant's unit-area load. Scores are based on ranking the subwatersheds from the lowest unit area pollutant load to the highest. A score of one for each pollutant corresponds to the subwatershed with the lowest unit-area load, while a score of 25 corresponds to the subwatershed with the highest unit area load. The aggregated total rank for each subwatershed is calculated by summing the three ranks for each individual pollutant. Subwatersheds with the highest total rankings are then recognized to have disproportionately high unit area loads across several pollutants. Here, as in the critical areas analysis, the scores delineating the subwatersheds into high, medium and low unit area load groups should be taken as a relative rather than an absolute measure. Figure 39 shows the overall scores for nutrients and sediment among subwatersheds based on unit-area loads within Ferson-Otter Creek.

The L-THIA model results for TN, TP and TSS when viewed in the aggregate show subwatersheds 3, 4, 9, 10, 12, 21, 23 and 25 to generate the highest unit-area loads. These subwatersheds overlap in large part with the subwatersheds that have the highest percentages of agricultural land by area (see the top two percentages classes Figure 37), with the exception of subwatersheds 21 and 23. Agricultural activities in this watershed are therefore implicated for generating a disproportionately large contribution of the nutrient and sediment loads in Ferson-Otter Creeks as predicted by L-THIA. However, more investigation into the sources of nutrient and sediment runoff is warranted, particularly into the dynamics of subwatersheds 21 and 23. These two subwatersheds possess some degree of agricultural land use, but agriculture is by no means dominant. If these subwatersheds do demonstrate high unit area loads as suggested by L-THIA, there might be factors in addition to agriculture contributing to these disproportionately high loads. Ideally, monitoring data should be collected with greater spatial resolution throughout the watershed. Such data can be used in conjunction with model results to inform identification of pollutant sources at a subwatershed level to guide nutrient and sediment runoff mitigation efforts. In the meantime, L-THIA model results are instructive in terms of where emphasis should be placed to reduce sediment and nutrient runoff.

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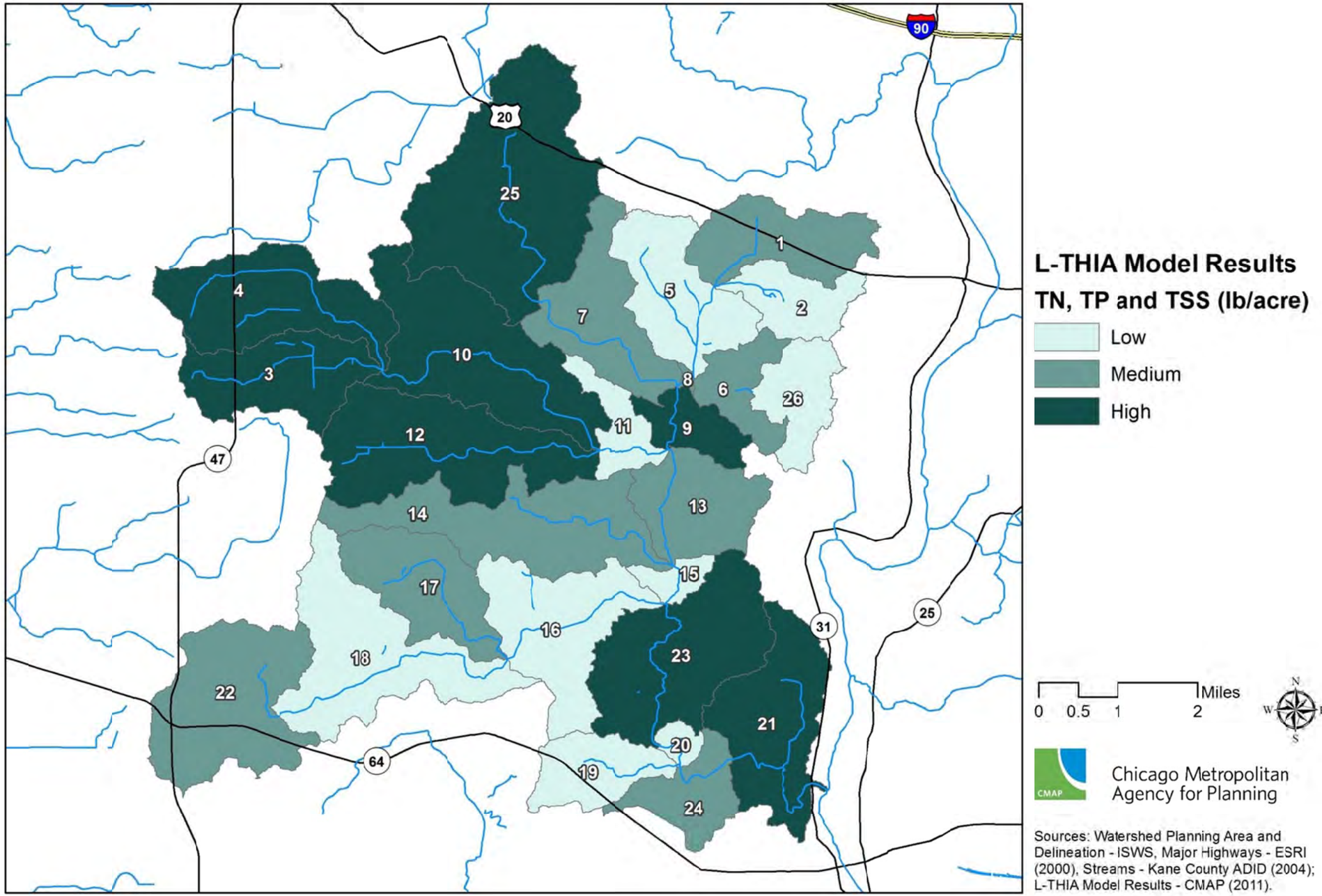
[135] Larry Theller, GIS specialist, Purdue University Department of Agricultural and Biological Engineering, email to author(s), September 21, 2011.
[136] Mill Creek Subwatershed Stakeholder Advisory Group. *Mill Creek Subwatershed Management Plan*, by Elizabeth Riggs. Ann Arbor, MI: Huron River Watershed Council, 2006. http://www.michigan.gov/documents/deq/ess-nps-wmp-mill-creek_209206_7.pdf (accessed August 18, 2011).
[137] White River Resource Conservation & Design, Inc. *Defining Critical Areas: Hogan Creek Watershed Project, Upper Anderson River Watershed Project and Tanners Creek Watershed Project*, by Kris Vance. PowerPoint presentation. Salem, IN: White River Resource Conservation & Design, Inc., 2011. https://engineering.purdue.edu/watersheds/webinars/IWLA2011/CriticalAreas/DefiningCriticalAreasVance.pdf (accessed August 18, 2011).

Figure 39. **L-Thia model results for TN, TP, and TSS, pounds per acre.**



# 4. NONPOINT-SOURCE PROJECT RECOMMENDATIONS

## 4.1 PROCESS OF SOLICITING PROJECTS

Stakeholders were encouraged to submit project recommendations for inclusion in the plan. Electronic and paper submissions were welcome. A few stakeholders utilized Google Earth software and ArcGIS to submit exact locations along with detailed project descriptions. A project submission sheet was also sent to all stakeholders on the watershed outreach list several times throughout the planning process. Utilizing the local knowledge of all the stakeholders, the planning process produced an abundance of project ideas. A total of 87 projects were submitted covering a wide variety of best management practices. As requested by IEPA, all submitted projects were organized into 5 categories: Urban, Hydrologic, Agriculture, Livestock, and Other.

## 4.2 SHORT TERM PROJECTS

After project solicitation, the stakeholders began discussion on selection criteria for short term projects, a subset of all submitted projects expected to be implemented within 5 years. Stakeholders settled on the following project selection criteria:

- Ability to address the Primary Contact use impairment in Ferson Creek,[138]
- Ability to address Aquatic Life and fish consumption impairments in downstream segment of the Fox River,
- Ability to support Ferson-Otter Creek Watershed Goals, and
- Lead implementer, local, and municipal support.

Given the uncertainty regarding sources of fecal coliform, there was much discussion on how these short-term projects might affect fecal coliform reductions. Outside of the pollutant load reductions calculated for each short-term project, additional recommendations that address the fecal coliform are discussed in Chapters 5 and 6.

Water quality benefits can also be achieved by addressing related impairments in the Fox River. The downstream segment of the Fox River was assessed and determined to be in nonsupport for Aquatic Life and fish consumption. The causes of impairment are dissolved oxygen, mercury, polychlorinated biphenyls, alterations in stream-side or littoral vegetative covers and other flow regime alterations. The sources of impairment were identified as streambank modifications/destabilization, impacts from hydrostructure flow regulation/modification, atmospheric deposition-toxics and unknown sources.

As previously noted, the Ferson-Otter Creek Watershed is within the Lower Fox River Basin. The watershed-based plan will need to specifically address the fecal coliform impairment. In addition, the plan can potentially positively impact some of the Fox River water quality concerns given that the Ferson-Otter Creek is a major tributary. The concerns include nutrients (phosphorus and nitrogen) and sediment or total suspended solids. Sources of these pollutants include both agricultural and urban runoff. Many of these sources of impairment are addressed in the plan's short-term projects.

Obtaining lead implementer, local, and municipal support for a project helps ensure successful implementation. Support can include grant match funds and partnerships. Local support can include non-profits, homeowners associations, individual private homeowners, etc. This criterion was added because stakeholders realized without support, project implementation is unlikely.

[138] The limited data and knowledge about exact locations and sources of impairment was understood and taken into consideration.

A total of 21 short-term projects were selected for the Ferson-Otter Creek Watershed Plan. Table 22 provides a summary of those 21 projects organized by IEPA categories. More detailed short-term project descriptions are provided in the remainder of this chapter.

**Table 22. Ferson-Otter Creek Watershed short-term projects, organized by IEPA project categories**

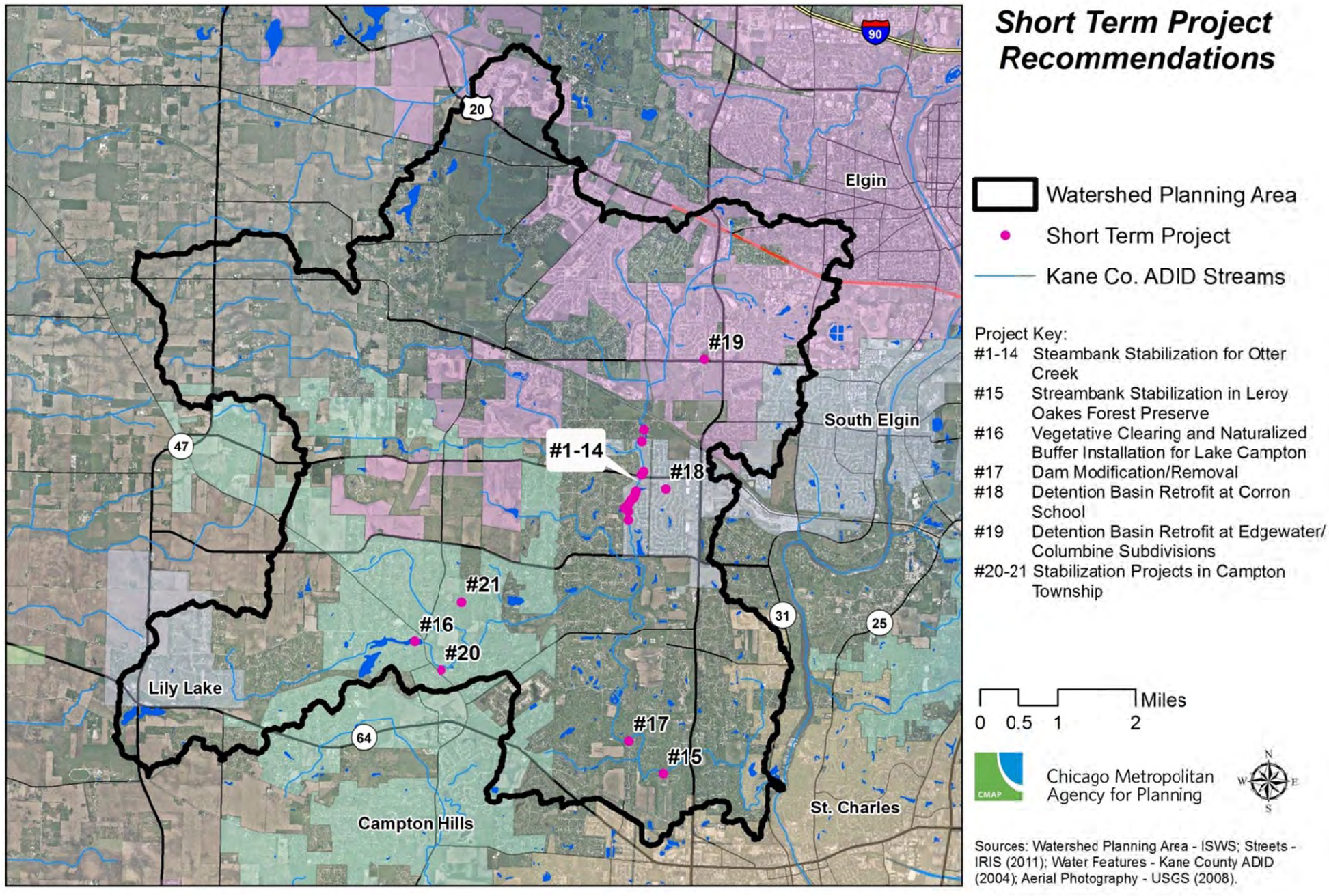
| IEPA CATEGORY | NUMBER OF PROJECTS | GENERAL DESCRIPTION |
|---|---|---|
| Hydrologic | 15 | Stream channel and stream corridor restoration projects to stabilize barks from erosion. |
| Other | 2 | Various improved management practices to reduce nutrient runoff and accumulation and improve habitat foraquatic life. |
| Urban | 4 | Retrofits to existing stormwater management infrastructure to address pollutant loading and increased runoff volume in developed areas. |
| **Total** | **21** | |

Additionally Figure 40 displays the location of each short-term project within the watershed. The projects are mainly located in the eastern half of the watershed..

After the short-term projects were selected, CMAP contracted with Hey and Associates to calculate pollutant load reduction and cost estimates for each project. Sediment, total suspended solids, phosphorus, fecal coliform, and nitrogen reductions were considered in the estimates. Table 23 summarizes expected pollutant load reductions organized by IEPA project categories.

Lastly, costs for each short-term project were calculated and are also displayed in Table 23. Cost estimates include construction, contingency, and design and permitting. **However it should be noted that some lead implementers will need to further develop project proposals. This will likely affect and potentially increase the estimated project costs due to a number of reasons including unforeseen variables such as site conditions, implementation timelines, etc.** Funding for these short-term projects will likely come from state and federal grants and local sources.

Figure 40. **Short-term project recommendation locations**




## Short Term Project Recommendations

Watershed Planning Area

Short Term Project

Kane Co. ADID Streams

Project Key:

#1-14 Steambank Stabilization for Otter Creek

#15 Streambank Stabilization in Leroy Oakes Forest Preserve

#16 Vegetative Clearing and Naturalized Buffer Installation for Lake Campton

#17 Dam Modification/Removal

#18 Detention Basin Retrofit at Corron School

#19 Detention Basin Retrofit at Edgewater/ Columbine Subdivisions

#20-21 Stabilization Projects in Campton Township

0 0.5 1 2 Miles

Chicago Metropolitan Agency for Planning

Sources: Watershed Planning Area - ISWS; Streets - IRIS (2011); Water Features - Kane County ADID (2004); Aerial Photography - USGS (2008).

**Table 23. Summary of short-term projects**

| PROJECT # | IEPA CATEGORY | BEST MANAGEMENT PRACTICE | LEAD IMPLIMENTER | UNIT | AMOUNT | COST | SEDIMENT (TONS/YR) | TSS (LBS/YR) | PHOSPHORUS (LBS/YR) | FECAL COLIFORM (COUNTS) | NITROGEN (LBS/YR) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Hydrologic | Regrade and Gabion, Station 7870-7990 | South Elgin | feet | 120 | $69,120 | 3.82 | — | 6.12 | — | 15.29 |
| 2 | Hydrologic | Stream bank armoring, Station 1360-2000 | South Elgin | feet | 140 | $45,360 | 3.72 | — | 5.95 | — | 14.86 |
| 3 | Hydrologic | Regrade w/Stone Toe and Gabion, Station 4920-5170 | South Elgin | feet | 250 | $144,000 | 7.96 | — | 12.74 | — | 31.85 |
| 4 | Hydrologic | Regrade with Stone Toe, Station 5280-5350 | South Elgin | feet | 70 | $17,640 | 1.11 | — | 1.78 | — | 4.46 |
| 5 | Hydrologic | Vegetative Maintenance, Station 7140-7290 | South Elgin | feet | 150 | $27,000 | 4.78 | — | 7.64 | — | 19.11 |
| 6 | Hydrologic | Gabion, Station 7380-7470 | South Elgin | feet | 90 | $38,880 | 2.87 | — | 4.59 | — | 11.47 |
| 7 | Hydrologic | Regrade and Gabion, Station 8150-8570 | South Elgin | feet | 420 | $136,080 | 13.37 | — | 21.41 | — | 53.51 |
| 8 | Hydrologic | Gabion, Station 8670-8980 | South Elgin | feet | 310 | $133,920 | 8.23 | — | 13.17 | — | 32.91 |
| 9 | Hydrologic | Regrade with Stone Toe, Station 6350-6490 | South Elgin | feet | 140 | $35,280 | 2.23 | — | 3.57 | — | 8.92 |
| 10 | Hydrologic | Regrade with Stone Toe, Gabion, and Vegetative Maintenance, Station 6620-6740 | South Elgin | feet | 120 | $90,720 | 2.55 | — | 4.08 | — | 10.19 |
| 11 | Hydrologic | Regrade with Stone Toe and Gabion, Station 6820-6870 | South Elgin | feet | 50 | $28,800 | 1.59 | — | 2.55 | — | 6.37 |
| 12 | Hydrologic | Gabion, Station 6960-7120 | South Elgin | feet | 160 | $69,120 | 6.79 | — | 10.87 | — | 27.18 |
| 13 | Hydrologic | Regrade with Stone Toe, Station 1190-1290 | South Elgin | feet | 100 | $25,200 | 1.59 | — | 2.55 | — | 6.37 |
| 14 | Hydrologic | Gabion, Station 7570-7720 | South Elgin | feet | 150 | $64,800 | 4.78 | — | 7.64 | — | 19.11 |
| 15 | Hydrologic | Streambank Stabilization Project; Leroy Oakes FP; Severe Erosion ( > 15 FT). Major bank stabilization to address sediment/TSS release into the stream. Channel stabilization also to be included. | Kane County Forest Preserve District | feet | 450 | $339,109 | 42.99 | — | 68.80 | — | 172.00 |
| 16 | Other | Clearing of woody tree and brush species for installation of lake shoreline buffer around Lake Campton, 20 foot buffer approximates to +/- 3.5 acres. | Lake Campton Property Owners Assocation | feet | 7,700 | $60,663 | — | 421 | 3.29 | 250,000,000,000 | 5.33 |
| 17 | Other | Working with private landowner to remove or modify existing dam north end of Knoll Creek West Subdivision, St. Charles Township, unincorporated Kane County. | Kane County | feet | n/a | $244,058 | ---------- No reductions in sediment or nutrient loading ---------- | | | | |
| 18 | Urban | Retrofit existing dry-bottom detention basin with native vegetation for increased filtering/pollutant removal, Corron School. | South Elgin | acre | 3.11 | $16,286 | — | — | — | — | — |
| 19 | Urban | Edgewater/Columbine Subdivision naturalized basin with combined drainage. | Elgin | acre | 4.7 | $76,542 | — | 1,473.71 | 5.79 | 1,220,000,000,000 | 1,123.01 |
| 20 | Urban | Stabilize eroded storm drainage channel which drains directly into Ferson Creek (banks > 5 ft); Drains Burlington Rd runoff onto Campton Township Gray Willows open space property. | Campton Township | feet | 200 | $50,000 | 5.34 | — | 8.86 | — | 2.21 |
| 21 | Urban | Stabilize eroded swale on Campton Township Gray Willows Property. Erosion > 4 feet in places; drains runoff from Fair Oaks Drive. | Campton Township | feet | 450 | $79,000 | 8.49 | — | 13.59 | — | 33.97 |
| | TOTALS | | | | | $1,791,578 | 122.00 | 1,895 | 205.00 | 1,470,000,000,000 | 1,598.00 |

## 4.2.1 Hydrologic Projects

### *#1-14 Steambank Stabilization for Otter Creek*

This streambank stabilization project consists of 15 separate project sites within South Elgin.[139] As the lead implementer, South Elgin finds it appropriate to list each project site separately. Collectively these sites improve the stability of 3,360 feet of Otter Creek streambank. The project sites vary in both slope and severity of erosion. Of particular concern is the village's trailway infrastructure (bike path) that is threatened by stream erosion seen in Figure 41. The main water quality benefit associated with the implementation of these projects is the reduction of nonpoint-source pollutants including sediment generated from erosion and in-stream sediment movement.

Figure 41. **Station 1860-2000**


### *#15 Streambank Stabilization in Leroy Oakes Forest Preserve*

This project site is located in the Leroy Oakes Forest Preserve. The site has severe erosion (> 15 feet) issues as seen below in Figure 42. Major bank stabilization best management practices are needed to address and reduce sediment and total suspended solids release into the stream. This reduction is the main water quality benefit associated with the project. Channel stabilization is also needed. The site also contains a substantial public safety concern due to drop offs in certain locations that reach about 24 feet in height. Kane County Forest Preserve District has been identified as the lead implementer for this project.

[139] One of these projects lists a private landowner as the lead implementer; however the land is located within South Elgin. South Elgin will work with the local landowner to establish a partnership for implementation.

Figure 42. **Streambank in Leroy Oakes Forest Preserve**

## 4.2.2 Other Projects

### *#16 Vegetative Clearing and Naturalized Buffer Installation for Lake Campton*

This project would entail the removal of existing woody tree and brush species from the shoreline of Lake Campton, followed by the establishment of a naturalized buffer. Both the clearing and the buffer installation (20 feet) are needed for 7,700 linear feet of shoreline shown in Figure 43. Lake Campton is privately owned and the Lake Campton Property Owners Association (LCPOA) has been identified as the lead implementer. The main water quality benefit of this project is the improvement in the quality and the reduction in quantity of stormwater that enters Lake Campton. Concentrations of phosphorus and nitrogen are the main concern to LCPOA. As part of the project, the LCPOA would also like to include an educational component in which the Association or another appropriate partner would provide educational materials to homeowners on the importance of naturalized buffers, proper working septic systems and proper use of lawn fertilizers with phosphorus.

### *#17 Dam Modification/Removal*

As lead implementer, Kane County will work with the private landowner to remove or modify the existing dam at the north end of the Knoll Creek West Subdivision located in St. Charles Township (unincorporated Kane County). The main water quality benefits associated with this project"s implementation include: decreased water temperature, increased dissolved oxygen, and minimized sedimentation behind the dam (if the dam were removed). Additional benefits would be increased fish and other invertebrates' passage as well as increased connection of the Ferson-Otter Creek Watershed with the Fox River.

Figure 43. **Lake Campton**


## 4.2.3 Urban Projects

*#18 Detention Basin Retrofit at Corron School*

This project entails the retrofit of a dry-bottom detention basin to native vegetation. South Elgin is the lead implementer for this project. Partnerships with the school district should be established and utilized. The main water quality benefit for this project is increased filtration of stormwater and pollutant removal.

*#19 Detention Basin Retrofit at Edgewater/Columbine Subdivisions*

Within the City of Elgin, separate detention/retention facilities of two subdivisions abut land within a third subdivision over which any collected but non-absorbed water then conveys (Figure 44). The City is responsible for the maintenance of one of the detention/retention facilities (North Columbine), and two different homeowners associations are responsible for the other detention/retention facility (Woodbridge) and the water conveyance area (Edgewater). Currently, the city is providing technical assistance to the Woodbridge Homeowner's Association (HOA) as that HOA seeks funding to naturalize their facility and generally implement other best management practices versus the original design. Their specific area consists of approximately 2.6 acres. Long term and depending upon funding, the city would like to naturalize the facility for which it is responsible, and the intent of such an effort would be that the plantings of all three areas make them appear as one larger area. The area for which the city is responsible consists of approximately 2.1 acres. The immediate area within the Edgewater subdivision (over which water conveys) is approximately 1.8 acres, but it is already naturalized. Long term plans could include a bike trail through the areas and educational opportunities, such as trail markers that explain the benefits of the larger, more-unified ecosystem, with before and after photographs. Elgin has been identified as the lead implementer for this project and will work in partnership with the appropriate homeowners associations on implementation.

The main water quality benefits of this project would result from the replacement of the basin's turf grass with native plants. Native plantings are a more sustainable alternative because they are drought resistant, promote infiltration and biodiversity, and require little maintenance. Native plantings help slow down flows which allow some of the pollutants in the water to settle out and be absorbed by the plants and microorganisms in the soil of the basin floor. With dense root systems making up two thirds of their biomass, native plantings enrich the soil with their organic matter. They also have high water-holding capacities and draw water deep into the earth, replenishing the shallow aquifer, because of the great depths their roots reach. Native plants support biodiversity by providing food and habitats for native birds and insects.

Figure 44. **Edgewater/Columbine Subdivisions**

*#20-21 Stabilization Projects in Campton Township*

Two separate but related stabilization locations have been identified as short-term projects. The first project entails the stabilization of an eroded storm drainage channel that not only drains directly into Ferson Creek but also drains Burlington Road runoff onto Campton Township Gray Willows Farm open space property (Figure 45). The second project entails the stabilization of an eroded swale that drains runoff from Fair Oaks Drive onto Campton Township Gray Willows Farm property located at 5N949 Corron Road, St. Charles, Illinois (Figure 46). Campton Township has been identified as the lead implementer for both of these projects. The main water quality benefit is the reduction in the amount of stormwater runoff and associated pollutants on the Gray Willows Farm property.

## 4.3 LONG-TERM AND ADDITIONAL PROJECTS

After the short-term projects were identified from all of the submissions, the remaining projects were classified as long-term, expecting implementation in 5-10 years from plan completion. These projects are located in Appendix A. Please note that the long- and short-term projects outlined in the plan do not represent all the opportunities for water quality improvement projects in the Ferson-Otter Creek Watershed. As more data and resources become available, additional projects that are not currently listed in the watershed plan may be considered by the Ferson-Otter Creek Watershed Coalition. It will be important that these additional projects directly correspond and reflect the plan's goals as stated in Chapter 1 of this plan.

Figure 45. **Fair Oaks Drive Gully**

Figure 46. **Burlington Road Gully**

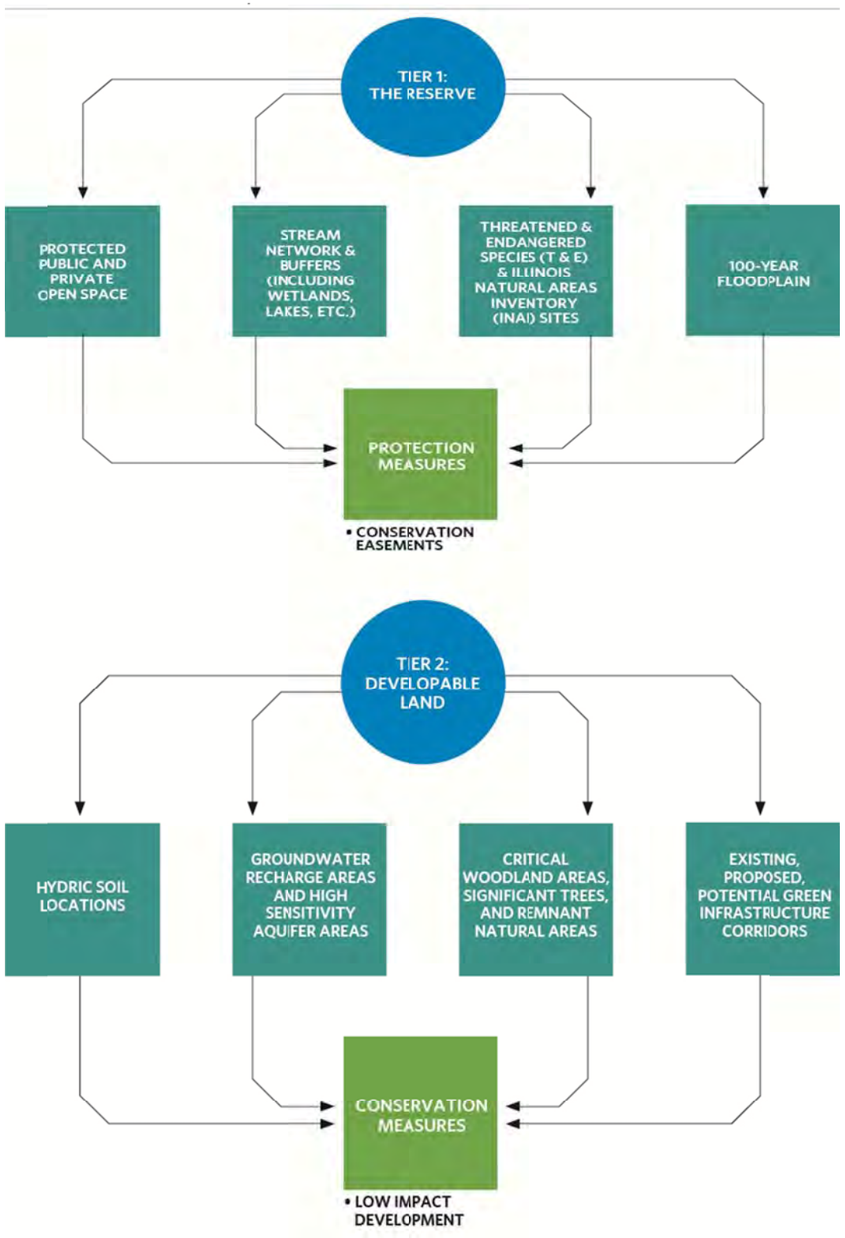
# 5. WATER RESOURCE POLICY RECOMMENDATIONS

In addition to on-the-ground project recommendations, water quality improvements in the watershed can also be made through policy recommendations. This chapter outlines various policy considerations including a green infrastructure framework, groundwater protection policies, agricultural best management practices, updates to codes and ordinances, fecal coliform related policies, and more.

## 5.1 GREEN INFRASTRUCTURE

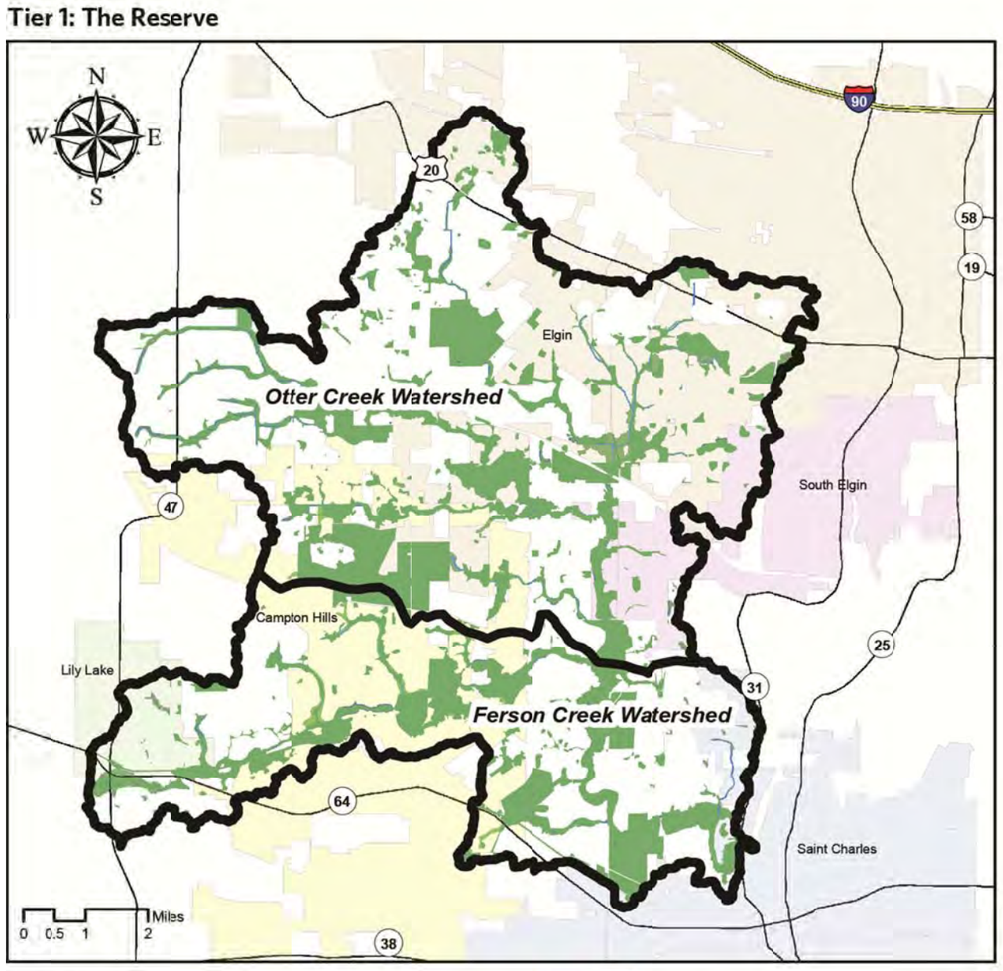
Green infrastructure can be described as an interconnected system of open space and natural areas that provides habitat for wildlife, flood protection, recreational opportunities, and water quality protection including groundwater recharge.[140] Green infrastructure functions much like gray infrastructure except instead of connecting roadways and streets, green infrastructure connects open space and natural areas. Open space and natural areas include publicly owned land such as park district property and forest preserves, privately owned land maintained by homeowners associations (HOAs), floodplains, and other areas. The components of green infrastructure can be organized in many ways. For this plan the components are organized into two tiers to create the Green Infrastructure Framework shown in Figure 47. The purpose of these tiers is not to prioritize open space and natural areas, but rather to group certain characteristics, functions, and areas together so that similar policy recommendations can be applied. Figure 48 displays Tier 1 and Tier 2 land areas within the Ferson-Otter Creek Watershed.

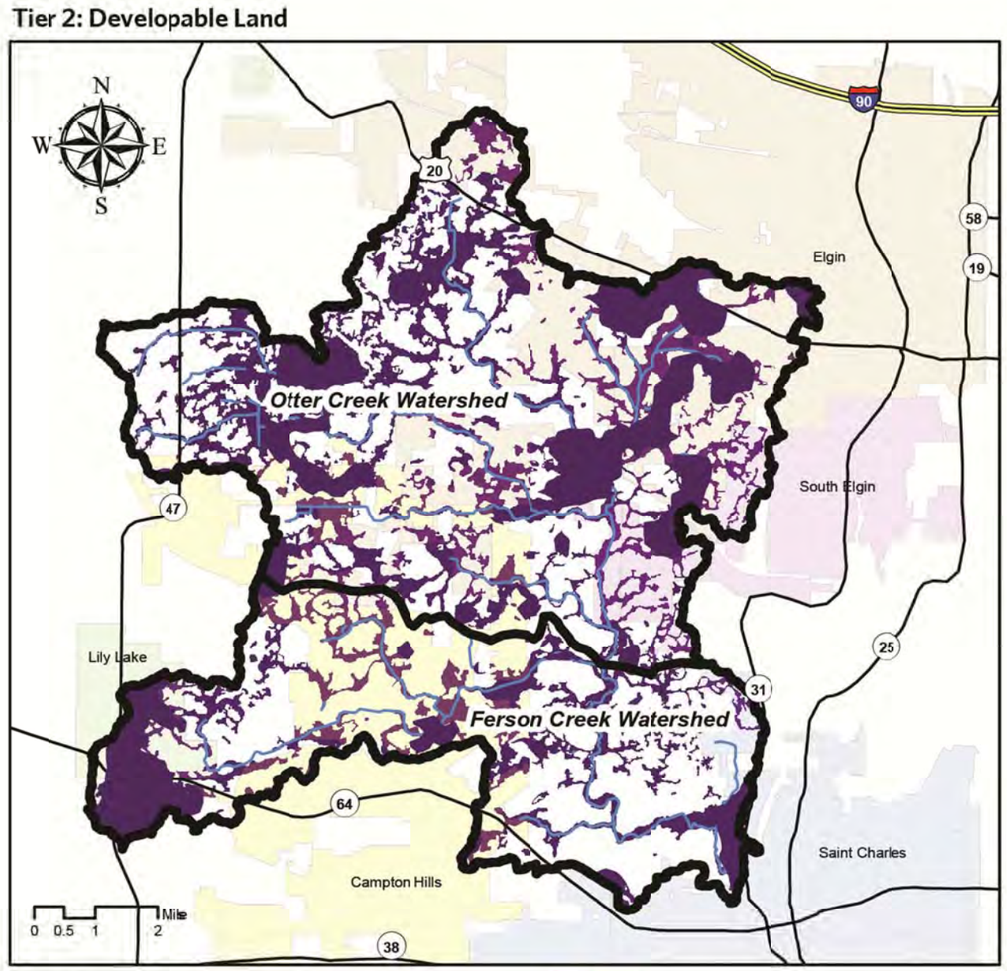
Figure 47. **Green infrastructure Framework**.




[140] "Managing Wet Weather with Green Infrastructure," U.S. EPA, last modified January 4, 2011, accessed November 9, 2011, http://cfpub.epa.gov/npdes/home.cfm?program_id=298.

Figure 48. **Tier 1 and Tier 2 land areas**



### 5.2.1 Tier 1: The Reserve

Tier 1 or the Reserve includes protected public and private open space, stream network and buffers, threatened and endangered species sites, Illinois Natural Areas Inventory Sites (INAI) and the 100-year floodplain (Figure 48).[141] Land identified in the Reserve either is currently protected or should be protected now and in the future.

**Recommendation: All Tier 1 landowners should apply or maintain protective measures including conservation easements (purchased or donated).**

Protected means either no land use change or limited land use change/activity depending on the particular component. Conservation of these areas will help to protect water quality and wetlands and protect against flooding. Other benefits include wildlife habitat protection including habitat connectedness and connectivity.

#### *Protected Public and Private Open Space*

This component includes current and future park district and forest preserve land, privately owned land maintained by homeowners associations (HOAs), and other open space/natural areas. The Tier 1 maps shows protected land from Campton Township, Kane County, St. Charles Park District, South Elgin, Elgin, and multiple homeowners associations. Open space provides flood storage, protects wetlands, provides habitat and connectivity for wildlife, and minimizes runoff that in turn reduces nonpoint source pollution.

#### *Stream Network and Buffers*

The stream network component includes the streams themselves, high habitat value and high functional value wetlands[142] and lakes. This plan recommends 100 foot buffers around the stream network with the first 60 feet closest to the network utilizing native plantings and the remaining 40 reserved for lower impact use, such as passive recreation (e.g., biking, jogging, etc.) and uninhabitable structures such as toolsheds.[143] This recommendation is beyond what Kane County requires, a buffer between 15-50 feet depending on the circumstances.[144] Protecting the stream network through buffers, especially with native planting, prevents pollutants from reaching the stream network in the first place. Additionally, buffers slow down the movement of water flowing into the stream network to help decrease erosion and sediment transport. Furthermore it is recommended that remaining wetlands within the watershed be restored where appropriate.

#### *Threatened and Endangered Species (T & E sites)*

There are 53 species in Kane County that are either classified as state threatened or endangered.[145] "Threatened" is defined as an animal or plant likely to become endangered within the foreseeable future throughout all or a significant portion of its range. "Endangered" is defined as an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range.[146] Within the watershed, there are several areas identified by IDNR that possibly contain threatened or endangered species.[147] Within these areas, 11 species have been identified and are summarized in Table 24. These areas are not mapped in the plan.

**Table 24. Status of threatened and endangered species**

| COMMON NAME | SCIENTIFIC NAME | NAME CATEGORY | STATE PROTECTION STATUS |
|---|---|---|---|
| White Lady's Slipper | *Cypripedium candidum* | Vascular Plant | **Threatened** |
| Spike | *Elliptio dilatata* | Vascular Animal | **Threatened** |
| Least Bittern | *Ixobrychus exilis* | Vascular Animal | **Threatened** |
| Kittentails | *Besseya bullii* | Vascular Plant | **Threatened** |
| American Burreed | *Sparganium americanum* | Vascular Plant | **Endangered** |
| Spotted Pondweed | *Potamogeton pulcher* | Vascular Plant | **Endangered** |
| Yellow-headed Blackbird | *Xanthocephalus xanthocephalus* | Vascular Animal | **Endangered** |
| Common Moorhen | *Gallinula chloropus* | Vascular Animal | **Endangered** |
| Royal Catchfly | *Silene regia* | Vascular Plant | **Endangered** |
| Blanding's Turtle | *Emydoidea blandingii* | Vascular Animal | **Endangered** |
| Prairie Moonwort | *Botrychium campestre* | Vascular Plant | **Endangered** |
| Speckled Alder | *Alnus incana ssp. Rugosa* | Vascular Plant | **Endangered** |

#### *Illinois Natural Areas Inventory (INAI) Sites*

The first Illinois Natural Areas Inventory was conducted from 1975-1978 by the University of Illinois. Since then IDNR has maintained and updated the inventory. The INAI includes sites that contain high quality natural areas, habitats of endangered species, and other significant natural features. INAI information is used to "guide and support land acquisition and protection programs by all levels of government as well as by private landowners and conservation organizations."[148] There are 5 INAI sites within the Ferson-Otter Creek Watershed area: Burr Woods Marsh, Lily Lake Marsh, Horlock Hill (previously Murray Prairie), Meissner Prairie (previously Russell Prairie), and Ferson Creek's Sedge Meadow. Together these sites cover 191 acres of the watershed.

#### *100-year Floodplain*

The 100-year floodplain was discussed earlier in the resource inventory chapter and is included as a Tier 1 Green Infrastructure Framework component because of the beneficial functions floodplains provide to a watershed.[149] An undeveloped floodplain helps contain flooding, aids in the absorption and filtration of water, and helps to minimize erosion and siltation in the waterway. Native plants can also increase the functionality of the floodplain.[150]

[141] The floodplain includes all floodways.
[142] As defined in NIPC, U.S. Fish and Wildlife Service and U.S. EPA. *Advanced Identification (ADID) Study, Kane County, Illinois Final Report*. Chicago, IL: USACE Chicago District, August 2004. http://www.lrc.usace.army.mil/co-r/pdf/KaneADIDReport.pdf (accessed November 7, 2011).
[143] Buffer recommendations support previous planning efforts (i.e. Village of Campton Hills Comprehensive Plan and Code Assessment) as well as CMAP's Model Stream and Wetland Protection Ordinance, October 1999 (http://www.cmap.illinois.gov/water-quality/about-fpa-requests). Furthermore, it should be noted that ideal buffer width can vary depending on the specific site conditions, desired buffer function, and the landowner's objectives. In the case where the site is also part of the 100-year floodplain, buffer width should reflect the larger of the two widths. For more information on buffer widths see: USDA NRCS. *Where the Land and Water Meet, A Guide for Protection and Restoration of Riparian areas.* Tolland, CT: USDA, September, 2003.
[144] *Protection of Special Management Areas*. *Kane County*, *Illinois, County Code*, Chapter 9, Article IV (2001). http://www.sterlingcodifiers.com/IL/Kane%20County/index.htm (accessed November 9, 2011).
[145] IDNR. *Illinois Natural Heritage Database: Illinois Threatened and Endangered Species*. Springfield, IL: IDNR, September 12, 2011. http://www.dnr.state.il.us/conservation/naturalheritage/pdfs/et_by_county.pdf (accessed November 8, 2011).
[146] "Endangered Species Glossary," U.S. Fish & Wildlife Service, last modified October 12, 2011, accessed November 8, 2011, http://www.fws.gov/midwest/endangered/glossary/index.html.
[147] Exact location information is not available for this watershed planning document.
[148] "Illinois Natural Areas Inventory," Illinois Natural History Survey, accessed November 8, 2011, http://www.inhs.illinois.edu/research/inai/.
[149] *Stormwater Management. Kane County, Illinois, County Code*, Chapter 9. http://www.sterlingcodifiers.com/IL/Kane%20County/index.htm (accessed December 19, 2011). It should be noted that Kane County's Stormwater Ordinance addresses floodplain requirements that are applicable to all of the county's municipalities.
[150] NIPC and Chicago Wilderness. *Conservation Design Resource Manual*, by Lori Heringa, Sarah Nerenburg, and Kathleen Odell. Chicago, IL: NIPC and Chicago Wilderness, 2003.

## 5.2.2 Tier 2: Developable Land

Tier 2 includes developable land that falls in one or more of the following components: hydric soil locations, groundwater recharge areas, high sensitivity aquifer areas, critical woodland areas, significant trees, remnant natural areas, and existing, proposed, and potential greenways and trails (green infrastructure corridors; Figure 48). Currently, land in Tier 2 is not formally protected but contains characteristics that are valuable to maintaining and protecting water quality.

**Recommendation: All Tier 2 landowners should incorporate low impact development (LID) best management practices when and if the land is developed.**

LID is a land development approach to managing stormwater that includes such practices as permeable pavement, native landscaping, and rain water harvesting to reduce runoff and pollutant loadings by managing stormwater as close to the source as possible. As stated earlier in the plan, urban runoff/storm sewers is an identified source of the fecal coliform impairment facing Ferson Creek. Recommending LID practices on developable land in Tier 2 is a proactive measure that reduces the future impact of built areas while maintaining the natural movement of water throughout the watershed.

Perhaps the most distinct difference between LID practices and traditional stormwater systems (sewers, pipes, gutters, etc.) is the view of stormwater as a resource rather than a waste product. LID practices can be used throughout the watershed from high density urban settings to low density areas and across a variety of land uses. Even though this section focuses on developable land, LID can also be used to retrofit existing sites as well as complete redevelopment sites.[151]

It should be noted that there are other similar development/stormwater approaches with similar goals of LID that could also be applied to land within Tier 2 such as Conservation Design and Light Imprint design. Conservation Design is a density neutral design strategy that incorporates similar stormwater treatments as LID while focusing on physical site design in which development is "clustered" to allow for a larger contiguous common open space.[152] Light Imprint is a design approach that focuses on creating compact, walkable, and mixed-use neighborhoods while incorporating stormwater management and natural drainage.[153]

### *Hydric Soil Locations*

As stated in the resource inventory, hydric soils cover nearly 30% of the watershed. Hydric soils were developed under sufficiently wet conditions and this condition should be considered when planning for development and land use change. These soils provide habitat for hydrophytic vegetation and other plant and animal species. For this reason, hydric soils are included in Tier 2.

### *Groundwater Recharge Areas and High Sensitivity Aquifer Areas*

Recharge areas for this component include the USGS recharge areas discussed in the Resource Inventory as well as fen recharge areas.[154] Recharge areas are important for water quality as well as water supply as they are one of the primary points where water enters the ground to replenish the aquifers.[155] As the majority of the watershed's communities rely on groundwater, Tier 2 also includes the High Sensitivity Aquifer Areas (A1-A4) to expand the recommended coverage of conservation measures in the Ferson-Otter Creek Watershed.[156]

### *Critical Woodland Areas, Significant Trees, and Remnant Natural Areas*

The purpose of this component is to minimize the effects of development on high value natural areas. Critical woodland areas, significant trees, and remnant natural areas are considered high value natural areas in the Ferson-Otter Creek Watershed. These areas are defined in Table 25.

**Table 25. Definitions**

| COMPONENT | DEFINITION |
|---|---|
| Critical woodland areas | Contiguous wooded areas larger than 4 acres on undeveloped parcels which contained woodlands in the same location in 1939 (verified through inspection of 1939 aerial photos in GIS.)[1] |
| Significant trees | Trees with 12" diameter trunks at 4' above grade except those determined to be hazardous or nuisance species and where it is agreed that the density of trees is greater than desirable for proper forest management.[2] |
| Remnant natural areas | Areas with a high degree of native biodiversity, i.e. native floristic quality index of 25 or greater and a native Mean C value of 3.2 or greater.[3] |

Sources:
1 Trotter and Associates, Inc. Green Infrastructure in the Village of Campton Hills. Campton Hills, IL: Village of Campton Hills, Augus: 2010. http://www.villageofcamptonhills.org/Join%20ERMC/VCH_GreenINF_RptFINAL_all_maps.pdf (accessed November 9, 2011). Data waby Kane County GIS Technologies Department.
2 Conservation Design Forum. Comprehensive Plan and Code Assessment. Campton Hills, IL: Village of Campton Hills, April 2010.
3 Ibid.

### *Existing, proposed, and potential green infrastructure corridors*

This component includes trails, greenways, corridors, and other areas of land that connect open space parcels. Not all of these areas were mapped for the plan, but they are included in Tier 2 because they are valuable open space that should have LID practices applied if and when these areas are developed.

[151] "Low Impact Development," U.S. EPA, last modified March 18, 2011, accessed November 9, 2011, http://www.epa.gov/owow/NPS/lid/. For more information, see also "Stormwater Management," Center for Watershed Protection, accessed November 9, 2011, http://www.cwp.org/your-watershed-101/stormwater-management.html.
[152] CMAP. *Conservation Design Strategy Report*. Chicago, IL: CMAP, August 2008. http://www.cmap.illinois.gov/strategy-papers/conservation-design (accessed November 8, 2011).
[153] "Light Imprint New Urbanism," Congress for New Urbanism, accessed November 9, 2011, http://www.cnu.org/node/1209.
[154] Christopher B. Burke Engineering West, Ltd. *Kane County Fen Identification and Recharge Area Mapping Project Final Report*. Batavia, IL: Kane County Department of Environmental Management, September 2004. http://www.co.kane.il.us/kcstorm/fen/final_report.pdf (accessed October 15, 2011).
[155] It should be noted that other groundwater recharge datasets exist that can be also be used for planning purposes within Kane County, specifically the following study should be considered: ISGS. "Kane County Water Resources Investigations: Final Report on Geologic Investigations," by William S. Dey, Alec M. Davis, B. Brandon Curry, Donald A. Keefer and Curt C. Abert. *ISGS Open File Series*, 2007-7. Champaign, IL: ISGS, 2007. http://library.isgs.uiuc.edu/Pubs/pdfs/ofs/2007/ofs2007-07.pdf (accessed November 3, 2011).
[156] As defined in ISGS. "Kane County Water Resources Investigations: Final Report on Geologic Investigations," by William S. Dey, Alec M. Davis, B. Brandon Curry, Donald A. Keefer and Curt C. Abert. *ISGS Open File Series*, 2007-7. Champaign, IL: ISGS, 2007. http://library.isgs.uiuc.edu/Pubs/pdfs/ofs/2007/ofs2007-07.pdf (accessed November 3, 2011). It should be noted that aquifer sensitivity is classified from Map Unit A to Map Unit E in order of decreasing sensitivity to aquifers becoming contaminated. For this plan, the stakeholders agreed to include only Map Unit A category (High Potential for Aquifer Contamination) in Tier 2. However subsequent categories such as Map Unit B (Moderately High Potential for Aquifer Contamination) should be considered for planning purposes when appropriate.

## 5.2 ADDITIONAL BEST MANAGEMENT PRACTICES

Existing developments could benefit from retrofit opportunities. Several naturalized detention basin retrofit projects are recommended in Chapter 4. Proper maintenance of detention basins is important to ensure their functionality.

The Center for Watershed Protection offers a variety of resources that articulate stormwater retrofit opportunities.[157] In addition, USEPA offers information on stormwater management best practices.[158]

**Recommendation: Communities within the watershed should consult the established water quality best management practice resources such as from the Center for Watershed Protection and the USEPA before any retrofit activity.**

## 5.3 GROUNDWATER PROTECTION

Regional water supply planning, which got underway in 2006, culminated with the publication of *Water 2050: Northeastern Illinois Water Supply/Demand Plan* in March 2010.[159] Water 2050 is informed by the most detailed water demand study ever conducted for the region.[160] Additionally, the work of the Illinois State Water Survey (ISWS) quantified the impacts of regional water demand scenarios on the deep-bedrock aquifer underlying the eleven-county planning area, shallow aquifer system beneath the Fox River Basin, and the Fox River itself.

With regional population projected to grow 38% by 2050, demand scenarios indicate growth in water use ranging from 36 – 64% under business-as-usual scenarios.[161] Given the new and enhanced understanding of regional water supply sources and their relatively finite or constrained nature, such growth in water demand is not thought to be sustainable. For example, at current withdrawal rates, the deep-bedrock aquifer is being mined. And overpumping of the shallow aquifer is beginning to capture streamflow where it has been studied in the Fox River Basin; a phenomenon that is projected to get worse as population and demand increases through time. In order to avoid supply / demand imbalances and offer some protection to other users of water (e.g., aquatic ecosystems), implementing *Water 2050* has the potential to keep water demand relatively flat – 7% growth – as compared to projected population growth.[162]

On the groundwater quality side of the resource management challenge, IEPA has concluded that the state's groundwater quality is being degraded.[163] In concert with that conclusion and as discussed in the water quality chapter, chloride concentrations are trending upwards in shallow wells throughout the six-county region. Thus, there are ample reasons for groundwater-dependent communities and private-well owners to work collaboratively and recommend that measures be implemented to improve protection (i.e., quality) and conservation (i.e., quantity) of local groundwater resources.

[157] Most recently summarized in Center for Watershed Protection. "Urban Stormwater Retrofit Practices." *Urban Subwatershed Restoration Manual*, Manual 3. Ellicott City, MD: Center for Watershed Protection, August 2007. http://www.cwp.org/categoryblog/92-urban-subwatershed-restoration-manual-series.html (accessed November 7, 2011).
[158] "Stormwater Management Best Practices," U.S. EPA, last modified August 16, 2011, accessed November 9, 2011, http://www.epa.gov/oaintrnt/stormwater/best_practices.htm.
[159] CMAP. *Northeastern Illinois Regional Water Supply/Demand Plan*. Chicago, IL: CMAP, March 2010. http://www.cmap.illinois.gov/water-2050 (accessed November 8, 2011).
[160] Southern Illinois University, Department of Geography and Environmental Resources. *Regional Water Demand Scenarios for Northeastern Illinois: 2005-2050*, by B. Dziegielewski and F.J. Chowdhury. Chicago, IL: CMAP, 2008.
[161] Ibid.
[162] Ibid. 166, p. 90. For example, although population increased in the City of Seattle, WA from 1990 to 2004, water demand during the same period still decreased.
[163] IEPA. *Illinois Integrated Water Quality Report and Section 303(d) List DRAFT, Volume II: Groundwater*. Springfield, IL: IEPA, 2010. http://www.epa.state.il.us/water/tmdl/303d-list.html (accessed September 15, 2011).

At the county level, the Kane County 2040 Land Resource Management Plan identified providing a sustainable water supply as one of the three major challenges facing the county through the year 2040. The population of Kane County is projected to increase more than 55 percent from the year 2010 population of 515,000 to over 800,000 by the year 2040. Lake Michigan water will not be available to Kane County due to legal and economic constraints. That leaves the shallow aquifer, deep aquifer and the Fox River as the future water sources for the county. Previous scientific studies offered only a qualitative understanding of the geology and hydrogeology of the county and scattered observations that were inadequate for water supply planning. Shallow aquifer withdrawals were close to exceeding sustainable yields in the eastern portions of the county and deep aquifer yields have long exceeded the sustainable supply in the region. The limitations of inland surface water supplies were also in question.

Therefore, Kane County entered into a contract in 2002 with the Illinois State Water Survey and Illinois State Geological Survey (ISGS) to conduct scientific investigations and prepare computer models and reports on the future availability of drinking water for Kane County. Preliminary results were completed by 2007, and the final reports and models were delivered in 2009.[164]

A series of surface water, geology and groundwater investigations were conducted, including streamflow analysis and modeling, mapping of groundwater levels, mapping and modeling of near-surface geology, analysis and trends in deep groundwater quality, assessment of shallow groundwater quantity, and computer modeling of groundwater flow.

The results are intended to allow the 30 municipalities and other water providers within the County to collectively plan and manage their future drinking water supplies based on a level of science unsurpassed by any other county in the State of Illinois. To that end, the County joined the five-county Northwest Water Planning Alliance (NWPA) in September 2010 to continue the process of cooperative planning for future water supplies, not only with the municipalities and water providers within the county, but also with neighboring counties and municipalities.

### 5.3.1 Groundwater Protection Ordinance

At the local level, the city of St. Charles has a groundwater protection ordinance that establishes regulations for land uses within Groundwater Protection Areas (GWPAs). These GWPAs are defined as portions of an aquifer within the minimum or maximum setback zones for existing and permitted water supply or within the 5- year capture zone of a well or well field.[165]

**Recommendation: Communities within the watershed that have not already done so should consider adopting Groundwater Protection ordinances.**

In addition to groundwater protection ordinances, Wellhead Protection Programs, sensible salting, demand-initiated water softeners, and street sweeping are other recommended plan strategies for groundwater protection.

### 5.3.2 Wellhead Protection Programs

Under the Safe Drinking Water Act Amendments of 1986, Wellhead Protection Program(WHPP)s are voluntary on the local level, but are a valuable supplement to existing state groundwater protection programs. A WHPP, once implemented, reduces the susceptibility of wells to contaminants.

[164] "Water Resources Investigations for Kane County, Illinois," ISWS, accessed November 8, 2011, http://www.isws.illinois.edu/gws/kaneco/kaneco.asp.
[165] *Groundwater Protection*. *City of St. Charles, Illinois, City Code*, Title 13 Chapter 18. http://stcharlesil.gov/codebook/Title-13/T13-CH18.pdf (accessed November 9, 2011).

**Recommendation: Appropriate authorities within the watershed should establish voluntary local protection programs such as wellhead protection plans.**

A sample process of developing a wellhead protection plan follows:

1) Organize a Local Committee
2) Map the Protection (sensitive) Areas Confined or Unconfined Aquifer
3) Conduct Contaminant Source Inventory
4) Develop Management and Protection Strategies
5) Plan for the Future – Contingency Plans, New Wells Adopt Maximum Setback Zones
   a) Additional Protection - 1,000 Ft. Radial Area
   b) Additional Siting Prohibitions - Certain Activities
   c) Extended "Compliance Point" for Remediation Sites to Meet Groundwater Quality Standards

### 5.3.3 Sensible Salting

Road salt can cause groundwater contamination from chlorides. Reducing the use of road salt and utilizing alternatives can help mitigate some of the negative effects on water quality. The idea of sensible salting includes the following recommendations developed for the DuPage River Salt Creek Workgroup[166] and are presented here for any entity responsible for winter highway maintenance within the watershed:

1) Provide proper training of road salt applicator staff and public education to build community awareness.
2) Conduct regular equipment maintenance and calibration.
3) Ensure proper salt storage, handling, and transport.
4) Explore greater reliance on anti-icing and deicing (e.g., prewetted road salt) practices.
5) Pursue judicious use of alternative deicing chemicals, including organic deicers such as those based on corn or beet derivatives.
6) Monitor salt use to determine program effectiveness.

A highway department can reduce both salt use and costs for winter roadway maintenance by following these measures.[167] Those with private wells can participate in groundwater protection from chloride contamination accordingly:

1) Adopt alternative water softening technologies such as electrodialysis or membrane filtration, and
2) Reconfigure plumbing to bypass the water softener for certain indoor water uses.[168]

Lastly county health departments can take the lead in making recommendations or creating new guidelines.

**Recommendation: Appropriate entities should follow sensible salting measures within the watershed.**

Luckily, there are already some communities within the Ferson-Otter Creek Watershed that are actively practicing these techniques. For example, South Elgin and Kane County implement pre-storm anti-icing practices. Elgin applies an in-house made Geomelt product that is 80% salt brine, 15% beet juice, and 5% calcium chloride. Elgin, Lily Lake, and Kane County use vehicles with computer or sensor controlled spreaders for pre-wetted solids. Kane County also has several vehicles that are equipped with computer or sensor controlled spreaders for liquids and pretreats salt with a carbohydrate.

The Village of Campton Hills and Campton Township primarily use a mix of Magic Melt, a green alternative de-icer, and salt. Calcium chloride is only used in extreme cold weather. Additionally an in-house system provides salt brine for pre-storm treatment and spreader regulators on every truck are set before each storm to ensure the appropriate amount of salt is dispersed. Together all of these practices have reduced the amount of salt used by Campton Hills and Campton Township by two-thirds.

### 5.3.4 Water Softeners

Communities that are dependent on groundwater often need a water softener, a device that reduces the hardness of water by replacing and/or exchanging certain elements in the water. A water softener either regenerates by a timer or a meter. The timer is set to a certain number of days and will regenerate no matter the water usage. A meter will monitor the water use and regenerate overnight when a certain amount of water has been consumed (known as demand-initiated). Maintaining that water use habits are the about same among households, it can be assumed that a timer-based water softener uses more water than a demand initiated water softener.

**Recommendation: Residents within the watershed should install demand-initiated water softener in their households. For households that are currently using a timer-based water softener, when replacement is necessary, residents should replace with a demand-initiated water softener.**

### 5.3.5 Street Cleaning

Street cleaning can help to improve water quality by reducing pollutants (sediment, trash, road salt, and trace metals) in stormwater runoff. Typically when it rains, water washes into sewers or into other stormwater management structures such as detention basin where the water is then treated to varying degrees. By removing pollutants and debris from the roadways on a regular basis before they are carried away by stormwater, water quality can be improved. The frequency of sweeping depends on weather conditions, traffic patterns, resources, and a host of other conditions. The optimal frequency should be determined for each government body. However there are suggested guidelines ranging from 9 times a year to biweekly based on the type of street.[169] Furthermore innovative sweeping practices and schedules may reduce the need for other structural stormwater controls while remaining cost effective.[170] There are several communities in the Ferson-Otter Creek Watershed that currently use best management practices in this area. South Elgin and Elgin use mechanical or vacuum sweepers while Kane County uses both.

**Recommendation: Local governments should review and revise current street sweeping practices and schedules to follow current best management practices.**

## 5.4 WATER EFFICIENCY/CONSERVATION

One approach to reducing wastewater volume is to practice water efficiency and conservation. By reducing the amount of water being used on the supply side (for toilets, showers, faucets, etc.), the amount of water being discharged is also reduced. This reduction in water volume reduces the amount of wastewater and its associated

[166] CDM. *Chloride Usage Education and Reduction Program Study Final Report*. Naperville, IL: DuPage River Salt Creek Workgroup, August 16, 2007. http://www.drscw.org/chlorides/ChlorideRecomendations.Final_Report.pdf (accessed November 9, 2011).
[167] Baxter and Woodman, Inc. "Chlorides and Agricultural Chemicals: Problem Assessments and Corrective Actions." *Illinois Groundwater Resources Management Plan*, Report 5. Woodstock, IL: McHenry County, Illinois, Department of Planning and Development, November 2006.
[168] Ibid.
[169] Minnesota Department of Transportation. *Resource for Implementing a Street Sweeping Best Practice*. Report no. 2008 RIC06. St. Paul, MN: Minnesota Department of Transportation, 2008. http://www.lrrb.org/PDF/2008RIC06.pdf (accessed November 8, 2011).
[170] "Parking Lot and Street Cleaning," U.S. EPA, last modified May 24, 2006, accessed November 8, 2011, http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=99.

pollutants. Water efficiency and conservation strategies can be especially helpful for communities that have combined wastewater and stormwater sewers.

Efficiency and conservation are similar concepts in that they both can reduce the amount of wastewater produced. Efficiency achieves reduced wastewater flows by replacing less efficient fixtures and/or appliances with more water efficient models as when a low-flow 1.6 gallon per flush toilet is replaced with a high efficiency 1.28 gallon per flush toilet. The same service, toilet flushing, is provided but with less water. Conservation includes efficiency measures but also includes behavioral changes in which residents consciously use less water such as only watering the lawn 2 days a week instead of 3 days a week during the summer. It should be noted that both water efficiency and conservation strategies need to be coupled with an outreach and education campaign. To complement outreach and education, there are policies and ordinances that municipalities can adopt to facilitate and promote water efficiency and conservation in their communities.

### 5.4.1 WaterSense Promotional Partner

One of the first steps toward becoming a more water efficient municipality is to become a WaterSense Promotional Partner. WaterSense is a voluntary, nationally recognized program sponsored by USEPA that promotes water conservation and efficiency.[171] Similar to the ENERGYSTAR program, there are two main branches of the WaterSense Program. First, is product labeling in which products such as toilets, faucets and showerheads are rated for compliance with WaterSense standards. If compliant, the fixture is then labeled as a WaterSense product. This typically means that the product uses approximately 20% less water than its conventional product. Table 26 contains all the current WaterSense products.

**Table 26. WaterSense products, Fall 2011**

| CURRENT PRODUCTS | FUTURE PRODUCTS |
|---|---|
| Toilets | Water softeners |
| Bathroom sink faucets and accessories | Pre-rinse spray valves |
| Showerheads | |
| Urinals | |
| Landscape irrigation controllers | |

The second branch offers a variety of voluntary partnerships. The promotional partnership is most appropriate for utilities, municipalities, and local units of government.[172] As the name infers, a promotional partner promotes the use of WaterSense products and water conservation and efficiency in general. The degree to which a utility or municipality "promotes" WaterSense is entirely up to partner and their available resources. The only requirement is that a partner provides an annual report (1 page form) of activities. Typical promotion activities include displaying a WaterSense logo on a municipal website, requiring WaterSense products for any rebate program, participation in Fix-a-Leak Week (March 11-19), or using public information materials provided to partners to communicate water conservation messages to residents.

The WaterSense Program is free and easy to sign up and participate in. The benefits include providing a starting point to launch a public information campaign by providing access to promotional materials such as bill inserts, magnet designs, press releases, public service announcements, etc. The program gives municipalities and utilities national attention on the WaterSense website and provides a WaterSense logo for outreach materials. WaterSense partners are part of a network with other communities/utilities where they can learn what others are doing in this region and the rest of the country. Additionally the partnership can provide a unified message for the watershed's residents about the importance of water conservation and efficiency if all represented municipalities were to join.

**Recommendation: All communities within the watershed should become WaterSense Promotional Partners.**

### 5.4.2 CMAP Model Water Use Conservation Ordinance

Beyond becoming a WaterSense Partner, municipalities can formally promote water efficiency and conservation practices through the adoption of all or a portion of CMAP's Model Water Use Conservation Ordinance. The 2010 ordinance is an update of the 1980 Model Water Use Conservation Ordinance completed by the Northeastern Illinois Planning Commission (NIPC) and provides draft language that may be directly incorporated into local ordinances and codes. The ordinance addresses conservation measures by sectors, including Residential and Commercial/Industrial/Institutional (CII) as well as location: indoors and outdoors. With additional sections covering key topics such as Variances, Water Waste, Pricing, Violations, and Information and Outreach. More information about ordinance items, examples, and additional resources are provided in the "Commentary," "In Practice," and "Learn More" sections, respectively. Where possible, local examples are highlighted and calculations of water savings that demonstrate benefits are also included. Of particular importance to this watershed plan is the adoption of the following ordinance components:

- Plumbing Fixtures and Fixture Fittings
- Dishwashers and Clothes Washers
- Water Recycling Systems
- Lawn watering
- Waterwaste

The model ordinance is a direct result of a larger regional effort *Water 2050: Northeastern Illinois Regional Water Supply/Demand Plan*, as previously mentioned in the Groundwater Protection section of the plan. Water 2050 includes additional information about water conservation and efficiency measures.

**Recommendation: All communities within the watershed and Kane County adopt portions or all of CMAP's Model Water Use Conservation Ordinance.**

Often a water conservation and efficiency plan is developed to help guide the adoption of related ordinances.[173] Currently none of the communities within the watershed have a water conservation and efficiency plan. However most of the communities do have a lawn watering ordinance, one of the topics covered in the model water conservation ordinance. In addition, Elgin's ordinances address waterwaste.[174]

[171] "Water Sense," U.S. EPA, last modified November 2, 2011, accessed November 7, 2011, http://www.epa.gov/WaterSense/index.html.
[172] "Water Sense Promotional Partners," U.S. EPA, last modified November 2, 2011, accessed November 7, 2011, http://www.epa.gov/WaterSense/partners/promotional.html.

[173] "Water Conservation Plan Guidelines," U.S. EPA, last modified November 2, 2011, accessed November 9, 2011, http://www.epa.gov/WaterSense/pubs/guide.html.
[174] *Waste of Water Prohibited*. *City of Elgin, Illinois, City Code*. Title 14, Chapter 4.04.140, http://www.sterlingcodifiers.com/codebook/index.php?book_id=524 (accessed November 9, 2011).

# 5.5 AGRICULTURE

## 5.5.1 BMPs Suitable for Agricultural Areas

In addition to wetland restoration opportunities on currently farmed wetlands, there are many other best management practices (BMPs) available and appropriate for implementation in agricultural areas. The Natural Resource Conservation Service (NRCS) Field Office Technical Guides (FOTG) comprehensively document conservation practices applicable to the State of Illinois as well as standards and specifications for these practices.[175] Standards describe the conservation practice and where it applies, while the specifications describe the detailed, site-specific requirements for implementing or installing a practice. Many of the conservation practices and BMPs that are discussed in this plan are thoroughly outlined in the NRCS Illinois FOTG. The following text is a set of guidelines that briefly describes the types of practices most commonly employed for conservation-orientated efforts in an agricultural context.

Many agricultural BMPs focus on livestock management. Better management of manure in agricultural areas can help to reduce nutrient, sediment and fecal coliform runoff contributing to water resource degradation. Developing a farm-wide manure management plan might involve such practices as excluding livestock from water bodies with fencing or stream crossings, along with the construction of alternative water sources to prevent contamination from manure entering water bodies. Similarly, diverting clean water away from areas covered with manure on farms can help to reduce contamination of runoff. To address sediment runoff caused by livestock, heavy use area protection helps to prevent erosion by creating foundations to support animals and soil where animals gather for watering and feeding.

**Recommendation: Livestock managers should implement livestock exclusion fencing to separate livestock from direct contact with streams. Developing an alternative water source could facilitate this exclusion. Heavy use area protections should also established to reduce erosion from livestock.**

Likewise, nutrient management is extremely important for preventing the loss of nutrients to storm runoff during and after precipitation events. Developing a nutrient management plan coupled with soil testing can help to prevent excess nutrient application while better matching the timing and form of nutrient application to the plant's need. A nutrient management plan allows farmers to adopt integrated strategies for monitoring and controlling the form, placement, timing and amount of fertilizer applications and other soil amendments which help to reduce nutrient runoff. Similarly, integrated pest management (IPM) seeks to apply a systems approach to agricultural management to reduce dependence on synthetic inputs, possibly improving water quality through less pesticide runoff. For example, IPM relies on the close observation of the lifecycle of pests and their interaction with the ecosystem to detect crop damage. When detected, further crop damage is prevented through the use of mechanical trapping, natural predators, growth regulators, chemical mating disruptors, and possibly the judicious use of chemical pesticides.

**Recommendation: Agricultural landowners should adopt integrated nutrient and/or pest management plans that help to reduce nutrient and pesticide runoff to streams in the watershed planning area.**

Finally, altering cropping practices can help significantly to reduce nutrient and sediment runoff. Prescribed or rotational grazing can be used to control the location, intensity, frequency, duration, and season of grazing, which can help to improve water quality and filtration and prevent erosion. Cover cropping, that is, maintaining a crop cover or crop residue in agricultural fields, increases nutrient retention in soil and prevents erosion. Green manure is cover cropping designed to add nutrients to soil and reduce required fertilizer application. In this case, the cover crop is grown for a specified amount of time and then plowed under. The related practice of conservation tillage (with variations including no-till and strip-till methods) leaves soil totally or partially untilled and covered with some amount of crop residue which prevents erosion and increases soil moisture. However, a higher reliance on herbicide with conservation tillage to control weeds may lead to more chemical runoff, so this practice might be best limited to those lands with the greatest risk of erosion.

**Recommendation: Cropland management practices such as rotational grazing, cover cropping and/or conservation tillage should be implemented to control erosion and reduce required nutrient applications.**

Additionally, many BMPs not specific to agriculture are still complementary to agricultural land use and appropriate for implementation by private landowners. The NRCS FOTG contain practice standards and specifications for many of these BMPs as well.[176] Upland erosion control relies on practices that slow and filter water prior to drainage into a water body, for example, grass waterways; terracing; buffer and filter strip creation; and installation or retrofitting of water and sediment control basins. Streambank or lake shore protection can prevent erosion using rip rap; longitudinal peaked stone toe protection; critical area seeding and bank re-shaping; tree revetments; root wad installation; stream barbs; bendway weirs; rock riffles; and grade stabilization structures to prevent streambank failure. Wetland protection, restoration or construction can improve water quality since wetlands act to filter water and can remove some particulate and dissolved contaminants such as sediment and nutrients. Finally, conservation easements are voluntary, legally enforceable land preservation agreements between landowners and a government agency. Conservation easements maintain open space and its associated environmental benefits by excluding development on protected lands. These easements along with naturalized streambanks and buffer strip plantings add to wildlife corridors and stream water quality as well.

**Recommendation: Agricultural landowners should implement general best management practices like upland erosion controls, streambank or lake shore protection (e.g., filter strips), and/or wetland protection/restoration to protect water quality, in addition to agriculture-specific BMPs discussed above.**

# 5.6 ORDINANCE REVIEW AND EXISTING POLICIES

## 5.6.1 Ordinance Review

Local ordinances and codes regulate and guide land use and subdivision standards for development. Among other influences, ordinances and codes dictate how stormwater runoff is stored and conveyed in, around, and through a community. For example how a community designates impervious surfaces such as sidewalks, streets, and parking has a substantial effect on the community's runoff both in terms of water quality and quantity. Research has shown a positive correlation between percentage impervious cover in a watershed and concentrations of nutrients, sediment, and trace metals in surface waters.[177] Thus as impervious cover increases, surface water quality is negatively impacted.

Kane County is one of the fastest growing counties in Illinois and continued urban growth is expected in the Ferson-Otter Creek Watershed. Therefore, it is important to understand how current development regulations and ordinances help shape communities and their impact on water quality. For example, Kane County's Stormwater Ordinance (effective January 1, 2002) was developed pursuant to state legislation granting powers to certain counties

[175] USDA NRCS. *Field Office Technical Guides*. Kane County, Illinois. Washington, D.C.: USDA NRCS, 2011. http://efotg.sc.egov.usda.gov/efotg_locator.aspx?map (accessed September 13, 2011).

[176] USDA NRCS. *Field Office Technical Guides*. Kane County, Illinois. Washington, D.C.: USDA NRCS, 2011. http://efotg.sc.egov.usda.gov/efotg_locator.aspx?map (accessed September 13, 2011).

[177] The Center for Watershed Protection. *Impacts of Impervious Cover on Aquatic Systems*. Mansfield, CT: University of Connecticut, 2003. http://clear.uconn.edu/projects/TMDL/library/papers/Schueler_2003.pdf (accessed November 8, 2011).

to regulate the discharge of stormwater.[178] This power was granted in recognition of the fact that stormwater management problems are generally regional in nature and impacts to stormwater management systems often go across typical government boundaries.

The purpose of this ordinance is to unify the stormwater management framework throughout the county and to establish a set of minimum standards that will apply to all new development throughout the county. The ordinance defines a "developer" who must obtain a permit for development. This ordinance applies to individuals, corporations and units of local government who propose new development after the effective date of the ordinance. Development activities which affect the discharge of stormwater are regulated under this ordinance. These include addressing such requirements as detention/retention, sediment and erosion control plans, floodplains and wetlands not regulated by the Corps of Engineers (COE).

In addition to the Kane County's Stormwater Ordinance, gaining a better comprehension of local policies is critical for outlining recommendations for code and ordinance updates for inclusion in this watershed plan. To facilitate this understanding, an assessment of local policies was conducted to compare existing regulations against the Code and Ordinance Worksheet (COW) created by the Center for Watershed Protection (CWP).[179] This worksheet provides an evaluation of development rules by assigning points on how well current rules agree with model development principles. The three categories on which points are assigned are: Residential Streets and Parking Lots, Lot Development, and Conservation of Natural Areas. The 'model' score for the worksheet is 100 and points are awarded when a development rule agrees with site specific planning benchmarks that directly or indirectly relate to stormwater management. The purpose of CWP's checklist is to provide a general assessment of a community's current ordinances and codes.

Municipal and county representatives within the watershed were asked to complete the worksheet for their respective units of government. The results of the completed COWs are in Appendix B. A majority of the governmental units within the Ferson-Otter Creek Watershed completed a COW.[180] It is important to note that while CWP sets a high standard for development regulation, the intent behind this review is to seek opportunities to reduce effective impervious cover to protect stream health and reduce future flooding. Governmental representatives are encouraged to explore locally appropriate rules that are more protective of water resources, particularly in future development.

The total scores are summarized in Figure 49 for each community and range from 44-78 out of a 100. The Center for Watershed Protection specific recommendations for each community based on their score and are displayed in Figure 50. It should be noted that the analysis is coded (A-E) to display the results anonymously.

After reviewing the results of the assessment, a community can choose to hold a facilitated "roundtable" with officials from municipal engineering, planning, and other departments to discuss what opportunities there are for ordinance updates and revisions. Those recommended changes may then move forward for action by elected officials. It should be noted that the CWP's guidelines are not ideal for every community, however, each community has opportunities for establishing ordinances and codes that further protect water quality and manage water quantity as it pertains to stormwater.

Figure 49. **Total Code and Ordinance Worksheet (COW) scores**

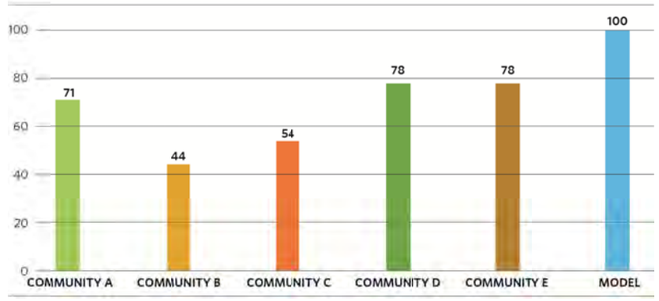



Figure 50. **Center for Watershed Protection's COW recommendations**

Center for Watershed Protection's Code and Ordinance Worksheet recommendations

| | |
|---|---|
| 90-100 | Congratulations! Your community is a real leader in protecting streams, lakes, and estuaries. Keep up the good work |
| 80 -89 | Your local development rules are pretty good, but could use some tweaking in some areas. |
| 70 -79 | Significant opportunities exist to improve your development rules. Consider creating a site planning roundtable. |
| 60 -69 | Development rules are inadequate to protect your local aquatic resources. A site planning roundtable would be very useful. |
| Less than 60 | Your development rules definitely are not environmentally friendly. Serious reform of the development rules is needed. |

The following text breaks out the analysis in the three sections designated on the COW: Residential Streets and Parking Lots, Lot Development, and Conservation of Natural Areas to provide more detailed data and recommendations.

[178] *Stormwater Management. Kane County, Illinois, County Code*, Chapter 9. http://www.sterlingcodifiers.com/IL/Kane%20County/index.htm (accessed December 19, 2011).
[179] "Better Site Design Publications," Center for Watershed Protection, accessed December 20, 2011, http://www.cwp.org/documents/cat_view/77-better-site-design-publications.html.
[180] Please note: no data was available for Lily Lake.

### *Residential Streets and Parking Lots*

From an analysis of the responses, the category that contrasted the most from the model principles was Residential Streets and Parking Lots (Figure 51). Within this category, scores ranged from 14 to 27 out of 40 possible points, averaging 20 which is 20 points less than the model score. The scoring for this category focused on principles related to reduced road lengths and widths, reduced surface parking, increased use of landscaping and pervious surfaces for stormwater retention, among others. Impediments to the use of model principles within current regulations include requirements for access to emergency vehicles and the location of water/sewer lines under parkways rather than paved roadways, both of which necessitate wider streets.

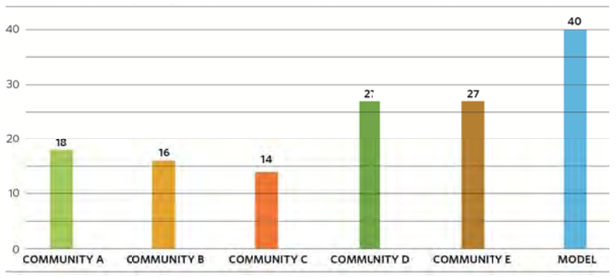
**Recommendation: Local governments should adopt ordinances that incentivize:**

- **shared parking;**
- **decreased dimensions in residential driveways/parking areas;**
- **use of biorention for on-site stormwater treatment;**
- **development design that minimizes road width and length;**
- **flexible arrangements to meet parking standards.**

Increasing flexibility in development design for example removing prescribed street dimensions in ordinances may allow for narrower streets and reduced impervious surfaces. Where possible, parking requirements should match level of demand,[181] allow flexible arrangements to meet parking standards, and provide flexibility to reduce parking in exchange for specific actions that reduce parking demands on site[182] through improved accessibility to transit or other alternative transportation options such as car-share.[183]

Access for emergency vehicles within narrow street designs has been successfully addressed in various parts of the country and standards for such street designs are available from sources such as the American Association of State Highway and Transportation Officials (AASHTO)184 and the Institute of Transportation Engineers (ITE).185

Figure 51. **Residential streets and parking lots results**




[181] For more information on Parking Management see "Parking Management Strategy Report Summary," CMAP, accessed December 20, 2011, http://www.cmap.illinois.gov/strategy-papers/parking.
[182] "Water Quality Scorecard: Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scale," U.S. EPA, last modified November 17, 2011, accessed December 20, 2011, http://www.epa.gov/smartgrowth/water_scorecard.htm.
[183] For more information on car-sharing, see "Car Sharing Strategy Report," CMAP, accessed December 20, 2011, http://www.cmap.illinois.gov/strategy-papers/car-sharing.
[184] AASHTO. *The Policy on Geometric Design of Streets and Highway*. Washington, D.C.: AASHTO, 2011.
[185] Lerner-Lam, Eva, Stephen P. Celniker, Gary W. Halbert, Chester Chellman and Sherry Ryan. "Traffic Engineering for Neo-Traditional Neighborhood Design." *ITE* (January 1992): 17–25.

### Lot Development

The lot development category focuses on principles related to development density, lot size/shape, driveways/sidewalks, and open space management. Within this category, scores ranged from 12 to 30 out of 36 possible points, 25 being the average score, Figure 52. In general most of the existing zoning ordinances allow for flexibility in lot development and open space design whereas subdivision regulations had more specifics on setbacks, driveways, and sidewalks that may not allow the incorporation of the model principles.

As in the residential streets and parking lots category, ordinance updates that include allowances for stormwater management BMPs and reduction in impervious cover may decrease the speed and increase the filtration of runoff prior to entering waterways. Additionally, reduced setbacks, smaller lots, and cluster development designs that maximize open space are additional measures that governmental entities can encourage within existing regulations (e.g., via density bonuses, to decrease overall impervious cover).

**Recommendation: Local governments should adopt ordinances that include:**

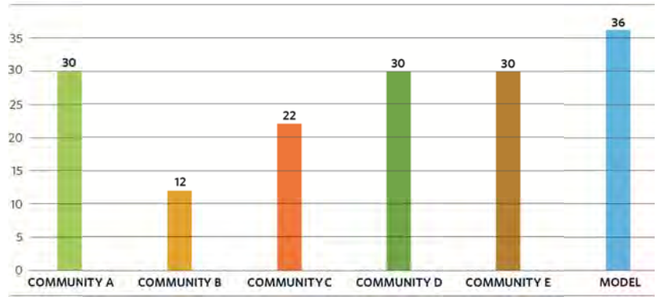
- **allowances for stormwater management BMPs and reductions in impervious cover;**
- **reduced setbacks, smaller lots, and cluster developments.**

From a regional perspective, local governments are encouraged to adopt policies and incentives to direct development to areas that have existing infrastructure such as water and sewer. This approach may reduce the overall development footprint in a watershed by maximizing use of existing sites. Additionally, compact, mixed use, and transit-oriented developments should be encouraged where possible to avoid loss of agricultural lands, increase conservation opportunities, and reduce degradation of streams and wetlands due to encroaching development and stormwater runoff.[186]

**Recommendation: Local governments should adopt policies and incentives that:**

- **utilize existing infrastructure such as water and sewer;**
- **encourage compact, mixed use, and transit-orientated developments.**

Figure 52. **Lot development results**




### *Conservation of Natural Lands*

The conservation of natural areas category highlights stream buffer maintenance, tree conservation, incentives for land conservation, treatment of stormwater prior to discharge from outfalls, and limitations on development within the 100-year floodplain. Scores ranged from 16 to 23 out of 24 possible points, with an average of 20 points (Figure 53). Again, it appears as if the majority of the respondents' local codes regarding the protection of existing natural areas and the incorporation of open space into new development are in line with the model principles. Potential areas of improvement may include adjustments in ordinances relating to stream buffers, stormwater outfalls, and tree conservation.

[186] "GO TO 2040 Comprehensive Regional Plan," CMAP, accessed December 20, 2011, http://www.cmap.illinois.gov/2040/main.

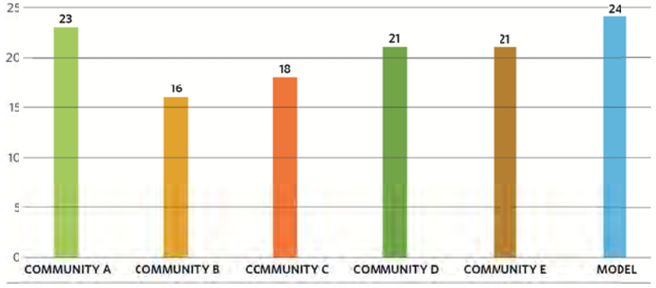
Other improvements could focus on long term protection, management, and restoration of natural areas and future habitats from future development. Local governmental units may wish to consider mandatory no-development buffer codes for critical areas such as wetlands, floodplains, lakes, streams, and rivers. Such areas may serve dual functions of providing recreational areas while reducing stormwater runoff.

**Recommendation: Local governments should consider a mandatory no-development buffer codes for critical areas such as wetlands, floodplains, lakes, streams, and rivers.**

To enhance the urban tree canopy, local governments are encouraged to adopt programs for tree protection and maintenance on public properties and right-of-ways, in addition to preserving trees on private property and requiring replacement when trees are removed or damaged during development. Local governments are also encouraged to increase the overall tree canopy through implementing tree planting initiatives.

**Recommendation: Local governments should adopt programs for tree protection and maintenance on public properties and right-of-ways, require tree replacement for trees lost during development, and implement tree planting initiatives.**

Figure 53. **Conservation of natural areas results**




## 5.6.2 Existing Best Management Practices

In addition to ordinances and codes, many communities in the watershed have already put some BMPs into place (Table 27).

**Table 27. Community existing best management practices**

| COMMUNITY | RAIN GARDENS | BIO-SWALES | NATIVE PLANTINGS | PERMEABLE PAVERS | LOW-IMPACT DESIGN |
|---|---|---|---|---|---|
| Campton Hills | – | – | – | – | – |
| Elgin | – | Yes | Yes | Yes | – |
| Kane County | Yes | Yes | Yes | Yes | – |
| Lily Lake | – | Yes | Yes | – | – |
| South Egin | Yes | Yes | Yes | Yes | – |
| St. Charles | Yes | Yes | Yes | – | – |

**Recommendation: Municipalities continue and/or begin to incorporate rain gardens, bioswales, native plantings, permeable pavers and low impact design.**

## 5.7 FECAL COLIFORM CRITICAL AREAS ANALYSIS

The following recommendations were developed from the fecal coliform critical areas analysis in Chapter 3. Three methodologies were used to help target fecal coliform related policy recommendations. The first methodology was based on the density of pet populations. The analysis found that certain areas of the watershed were likely contributing a higher proportion of pet waste to the watershed.

**Recommendation: The Village of Campton Hills and Kane County should adopt a pet waste pickup ordinance.**

It should be noted that the city of Elgin was also identified in this analysis but already has a current pet waste ordinance.[187] Promoting a new policy such as this will then require an outreach and education campaign to raise awareness of benefits of pet waste pickup.

The second methodology involved estimating density of parcels that use septic systems. The analysis found that certain areas of the watershed were likely contributing a higher proportion of potential septic system failures, assuming a uniform failure rate.

**Recommendation: The Village of Campton Hills, the Village of Lily Lake, and Kane County should require or at least encourage cyclical septic system maintenance.**

As stated in the recommendation, cyclical septic system maintenance is at the very least encouraged. One example of such a program is found in Isle of Wight County, VA where legislation was enacted requiring regular septic tank maintenance.[188] Their septic tank pump-out initiative is a state-mandated program that requires regular septic tank pump-outs at least once every three to five years under Article 6 of the Chesapeake Bay Preservation Area Ordinance (CBPA). CBPA more broadly is legislation in the Chesapeake Bay Watershed that regulates development occurring in the watershed, promoting natural vegetative land cover to protect Chesapeake Bay water quality.

The third methodology involved estimating those areas with higher percentages of agricultural areas used for livestock and equestrian purposes. The analysis concluded that areas with more than 5% livestock and equestrian agricultural use were high priority areas.

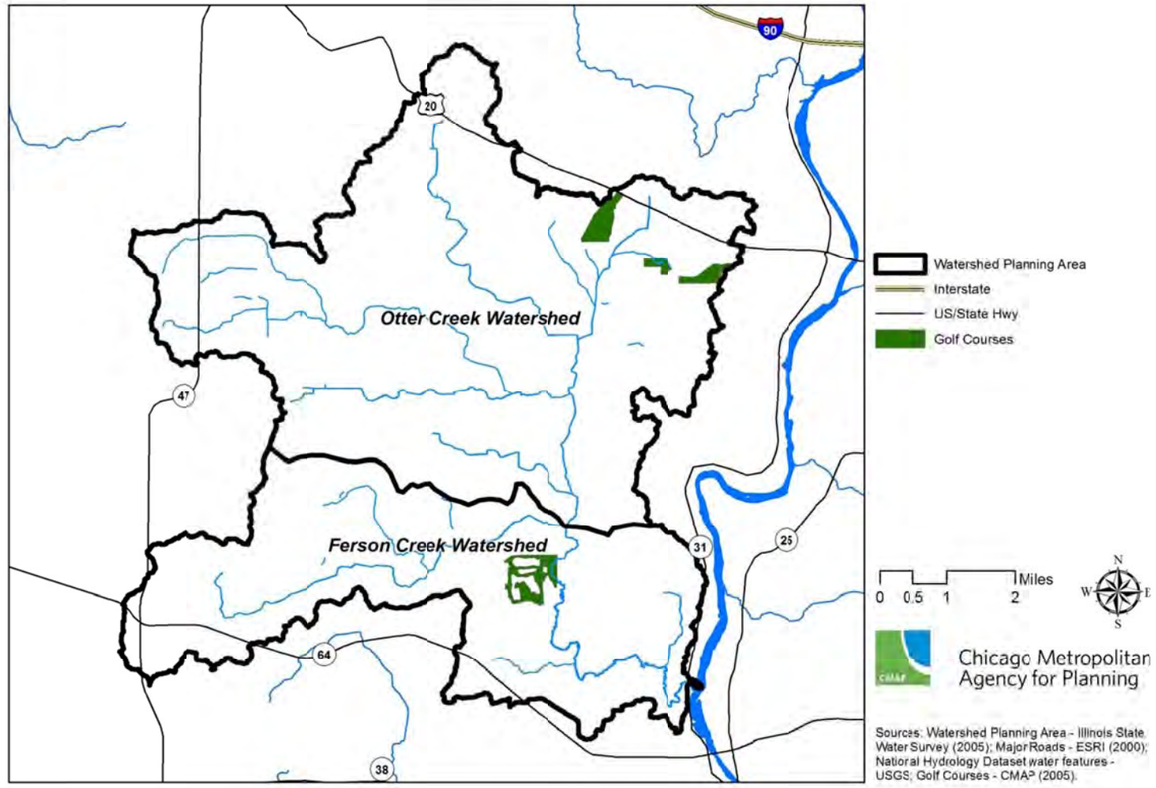
**Recommendation: Livestock and equestrian landowners in the Village of Campton Hills and Kane County should be contacted and encouraged by local authorities or agencies (e.g., county Soil and Water Conservation Districts) to adopt manure management plans and livestock exclusion (from direct access to streams) practices.**

## 5.8. GOLF COURSES

There are 435 acres of golf courses within the Ferson-Otter Creek Watershed (Figure 55). Typically golf course landscapes consist primarily of turf grass and do not include stream buffers to help protect water quality. Furthermore, golf course management strategies such as the application of pesticides and herbicides can have an additional negative effect on water quality. The Audubon Cooperative Sanctuary Program is an award winning education and certification program that empowers golf courses to protect the natural fe mend courses while improving water quality.[189]

**Recommendation: The Ferson-Otter Creek Watershed Coalition as well as other intere the local golf course management teams to move them towards becoming certified under the Audubon Cooperative Sanctuary Program.**

Figure 54. **Golf course locations in Ferson-Otter Creek Watershed**




[187] *Removal Of Debris And Residue*. *City of Elgin, City Code*. Title 9, Chapter 32.IV, Section 250.C.2. http://www.sterlingcodifiers.com/codebook/index.php?book_id=524 (accessed November 30, 2011).

[188] *Septic Pump-Out Program*. *Isle of Wight County, Virginia, County Code*. Appendix B-1, Article 6. http://library.municode.com/HTML/14449/level2/APXB-1CHBAPRAROR_ART6SEPUTPR.html#TOPTITLE (accessed December 20, 2011).

[189] "Audubon Cooperative Sanctuary Program for Golf Courses," Audubon International, accessed November 9, 2011, http://acspgolf.audubonintemational.org/.

# 6. PUBLIC EDUCATION AND OUTREACH

We all have an impact on water quality. From the cars that we drive to the fertilizer we put on our lawns, pollutants from these activities and many others wash off the land and flow across the landscape, often through storm sewer systems, to our rivers and streams. These individual actions have relatively small impacts on water quality, but when looked at cumulatively they have a huge impact. This is nonpoint source pollution, so named because it does not originate from one pipe, but from many sources scattered across the landscape. Nonpoint source pollution is the nation's largest remaining water quality problem.

Education and outreach is essential to improving water quality within a watershed. If people don't understand what effects their actions have on water quality, improvements might be made through regulation and incentives, but only for a period of time. People want to do the right thing; they often just don't know what it is or how to do it. A watershed plan needs to include ways to make stakeholders aware of the issues, informing them on what needs to be done, and motivating them to take action. If stakeholders are involved in creating and implementing the plan, research shows that the watershed will have a higher level of long-term support and success.

Education of local residents must start with the basics; many studies have found that although the general public has heard the term "watershed," few are able to define it or explain how they have an impact on it. Not only will the education and outreach campaign need to define terms, but it will need to raise a general awareness of the problems in the watershed and the potential solutions. Then the campaign will need to find a way to motivate residents to act, contributing to improving water quality through their own actions, their government, and their family. The impact of not taking action must also be demonstrated.

This section of the watershed plan will lay the groundwork for creating a successful education and outreach campaign. First, it will summarize some existing literature on how to create a successful education and outreach campaign. Then it reviews some education and outreach activities that occurred during the watershed planning effort. Lastly, this section closes with a look ahead at education and outreach activities that were determined by the stakeholders to be necessary for improving water quality in the Ferson-Otter Creek Watershed.

## 6.1 EDUCATION AND OUTREACH CAMPAIGNS

There are many resources available to assist in developing an effective watershed education and outreach campaign. Agencies like USEPA and IEPA have many resources available including U.S. EPA's *Getting in Step: a Guide for Conducting Watershed Outreach Campaigns* (2003) and CMAP and IEPA's *Guidance for Watershed Action Plans in Illinois* (2007). Not-for-profit organizations like the Center for Watershed Protection and The Conservation Foundation are also great sources of information, often having brochures, fliers and other information applicable to watershed problems already on hand. The following information summarizes key findings from these resources.

### 6.1.1 Cause-Based Marketing

Research has shown that cause-based or social marketing is the most effective way to get people to change their behavior. Cause-based marketing is the practice of looking at people as consumers, but instead of selling products or services, as a watershed group, we are selling ideas, attitudes and behaviors. The goal of cause-based marketing is not to make a profit, but to improve society and the environment. Part of this campaign should include persuading the public that there is a problem that only they can solve.

#### *Identifying the Audience*

Before any of the following education and outreach strategies are employed, the target audience must be identified. Different strategies will be used for different audiences. For example, if the goal is to reduce fecal coliform in the watershed, then targeting residents that have pets might be an effective strategy. The target audience should be broken down into the smallest segment possible to achieve the best results, then creating a message that resonates with the target audience and inspires them to act.

#### *Understanding the Audience*

Knowing some information about the target audience is essential. Campaign audiences have varied values and beliefs, and they will not necessarily be the same as those implementing the watershed plan. The following is a list of a few questions that are important to know about the target audience, before education and outreach activities begin:

1. What does the audience know already?
2. What are their existing beliefs and perceptions?
3. How does the audience receive messages and information?
4. What will make the audience change their behavior?
5. Other important factors include: education, age, culture, and religion.

The understanding of the audience can be completed at the same time or subsequent to identifying the audience. Surveys, focus groups, and even simple observations can lead to a greater understanding of the audience and a successful campaign. In order to create a successful education and outreach campaign, a manager must also consider how to most effectively convey that message to the target audience.

#### *Barriers*

Another component to establishing a successful education and outreach campaign is anticipating problems and road blocks. Barriers are just that: problems that might prevent residents from changing their behavior. Often barriers include time and/or resources. A barrier can also be that a person is simply not aware of the effect of their actions.

A common barrier is the social acceptability of the desired action. For example, rain gardens or other native vegetation is often perceived as looking weedy or unkempt. A resident might want to improve infiltration and have a low maintenance garden, but is resistant to installing a rain garden because he does not want to offend neighbors. The message needs to be conveyed to that resident and neighbors that natives can be planted in beds, can be low to the ground, and not look weedy. In this regard, barriers can be minimized or removed.

#### *Social Norms*

Related to the example just cited are social norms. Social norms are the behavioral expectations and cues within a group of people. It is a social norm that we maintain our lawns with grass species that are mowed to a certain height frequently. Through education and outreach, new examples need to be created showing the different, desired action. Then one by one, new social norms need to be established. People are more likely to change their behavior if they see someone else benefitting from the new behavior.

#### *Creating and Formatting the Message*

Messages must be clear and contain specific calls to action. They are designed to raise awareness, educate or motivate to action. Campaigns should inform and suggest acceptable behaviors.

Messages need to capture the audience's attention. What is needed to get the audience's attention will vary by different segments of the audience. Insights to this information may have been gleaned when identifying the

audience, through information such as demographics or may be indicated by the message itself. Ask people to do something in response and let them know what effect this behavior will have. Be clear and concise. Consider what behavior you are trying to change and what behavior should replace it.

How the message is distributed to the audience can make or break an outreach campaign. The packaging of a message can help foster relationships and a sense of community, build understanding, and motivate people to action or it can be expensive and time consuming while producing little results. The target audience should dictate which format should be used to convey the message. Formats can change over the course of the campaign.

A campaign could start out raising general awareness with public service announcements (PSAs) and once the audience understands the problem, brochures could be distributed to further inform residents about what they can to do to contribute to the solution. According to the USEPA's *Getting in Step* guide, if the budget is small, the frequency in which your audience hears or sees the message is important. The following describes formats and messages that were used during this planning effort.

## 6.2 WATERSHED PLANNING PROCESS ACTIVITIES

A variety of education and outreach activities took place during the creation of this plan. They have laid the groundwork for a successful education and outreach campaign.

### 6.2.1 Website

Materials for the watershed planning effort are currently located at the Fox River Ecosystem Partnership website: www.foxriverecosystem.org/ferson_otter.htm. Agendas, maps, upcoming events, and the watershed plan are posted there.

### 6.2.2 Literature

Two brochures were developed as part of the watershed planning effort. The first brochure provides information about the watershed planning effort itself. The second brochure contains more detailed information about nonpoint source pollution and BMPs. In addition, a poster was developed for the Ferson-Otter Creek Watershed to show what can be done to reduce potential sources of fecal coliform, thereby improving water quality.

### 6.2.3 FREP Noon Networks

Stakeholders helped identify and coordinate a program for the (October 19, 2011) FREP Noon Network. The Ferson Creek dam removal at LeRoy Oakes Forest Preserve in St. Charles was the focus of the Noon Network in which 12 people attended.[190]

### 6.2.4 Stream Walks and Open House

Stakeholders and landowners visited various points of interest and concern along both Ferson and Otter Creeks. A second stream walk was held at the St. Charles Park District's Otter Creek Bend Park. Members and stakeholders toured the park and heard from Steve Belz, from Black Creek Hydrology, regarding two 319 implementation projects for bank stabilization.

### 6.2.5 Municipal Outreach

The Conservation Foundation created visual presentations to help keep our municipal partners informed of the watershed planning process, and to let them know we would be visiting again to ask for plan adoption. We made scheduled appearances with municipal staff, board and/or committee members at Lily Lake, South Elgin, Elgin, Campton Hills, St. Charles, Campton Township and Kane County.

### 6.2.6 Presence in the Community

Throughout the late summer and early fall we participated in a number of community events in each of the communities identified in the Ferson-Otter Creek Watershed. We participated and/or distributed information to stakeholders at: National Night Out, Campton Hills; Riverfest Express, South Elgin; Hawthorne Pond Walk, Elgin; Prairie Fest, Campton Township; and Scarecrow Fest, St. Charles.

### 6.2.7 Open House

The watershed planning process was presented to stakeholders at a public forum on March 29, 2011 from 4:30 – 6:30 PM, where people could ask questions of CMAP, TCF, and other parties involved in writing the plan.

## 6.3 ACTIVITIES GOING FORWARD

Throughout the watershed planning process, the stakeholders discussed education and outreach a number of times. The following recommendations and list of activities for targeted audiences were determined to be desirable. Stakeholders expressed an interest in partnering with state and regional resources with similar goals and missions. A list of state, regional, and local resources is found in Appendix C.

### 6.3.1 Organization

Momentum from the planning process will continue through the organization of a "coalition" to help encourage plan implementation and continue efforts towards reaching the plan's goals. The interim name for this entity is the Ferson-Otter Creek Watershed Coalition and is in direct response to watershed Goal #7 in Chapter 1.

Ideally the Coalition would meet quarterly. More frequent meetings could be warranted depending on current activities such as applying for grant funding or urgent watershed issues. The Coalition could be supported by dues collected from interested parties. The planning process reviewed and considered similar successful models from the DuPage River Salt Creek Workgroup and the Lower DuPage River Watershed Planning processes.
The Coalition will mostly likely consist of current interested parties that were active during this planning process in addition to other potential partners. A desired outreach list to continue building the Coalition is provided in Appendix D. This list is not exhaustive and was the original outreach list utilized by The Conservation Foundation at the beginning of this planning process.

In terms of staffing, the Coalition would be best served by hiring a watershed coordinator to organize and lead this effort. The watershed coordinator would provide a focused, local approach to watershed planning, taking into consideration regional activities and opportunities. The ideal candidate will be familiar with available resources, grant writing, and fostering collaborative partnerships/efforts. The coordinator would establish a presence with each of the watershed municipal governments as well as with other partners to promote the goals and priorities in the watershed plan. Please note that grant to grant support for the watershed coordinator position is not the preferred funding option due to lack of financial stability.

[190] "Program Presentations," FREP, accessed November 9, 2011, http://foxriverecosystem.org/presentations.htm.

**Recommendations: The Ferson-Otter Creek Watershed Coalition should:**

- **Hire a part-time watershed coordinator to promote and coordinate the implementation of the watershed plan's recommendations;**
- **Partner with existing organizations to provide a 319 grant writing workshop to assist lead implementers with 319 applications;**
- **Work with partnering organizations to raise awareness about all potential sources of fecal coliform bacteria and water quality;**
- **Heavily target landowners/Homeowners Associations, especially those identified in the critical areas analysis for fecal coliform, about proper septic maintenance and warning signs of a failing system;**
- **Distribute USEPA's Healthy Lawn Care Practices and Reduce Runoff: Slow it Down, Spread it Out, Soak it in! DVD to Homeowners Associations for use at meetings as an educational tool;**
- **Continuously work with municipalities to promote the use of CMAP's Model Water Use Conservation Ordinance in their respective municipalities;**
- **Hold two educational seminars per year on stormwater issues for all NPDES[191] Phase II permit holders in the watershed.**

## 6.3.2 Public Awareness Campaign

It may be desirable to put a number of the activities listed below together into a campaign that would pool resources from, and benefit, the entire watershed. The Coalition would conduct pre-campaign research to identify and better understand the targeted audience, develop a slogan, determine the method(s) and message(s), develop a fixed timeframe, and include pre- and post- testing to gauge effectiveness.

### *Website*

Websites are an excellent way of quickly connecting to a large audience. A mix of scientific and general information about the watershed can be located all in one place. The material can be changed and updated frequently and people can provide feedback and information quickly. A website is a relatively inexpensive education and outreach tool.

**Recommendation: The Ferson-Otter Creek Watershed Coalition should investigate ways to maintain the existing website on the Fox River Ecosystem Partnership website.**

### *Brochures*

Printed material is a popular format for conducting education and outreach activities. It can be created easily and inexpensively. People can refer to printed materials again and again. The current brochures created for this planning process should continue to be distributed as long as they are useful. New brochures could be developed or adapted to cover additional topics including BMPs for homeowners, information on proper salt and fertilizer use, and information on fecal coliform.

### *Interpretive Signs*

Interpretive signs communicate specific messages to viewers. These messages can be written to change behavior, educate, or evoke an emotion in the reader. They are mounted so they are visible to all viewers and can be constructed of many different materials. Interpretive signs can be used to educate viewers on a number of water quality issues: the purpose of detention ponds, no mow zones, establishing native plants, being a good neighbor to wetlands, etc.

[191] "National Pollutant Discharge Elimination System (NPDES)," U.S. EPA, last modified March 12, 2009, accessed December 20, 2011, http://cfpub.epa.gov/npdes/.

### *Public Service Announcements*

A public service announcement (PSA) can be an inexpensive way to reach a variety of people. PSAs can be broadcast on radio, television or even on websites. In addition to the USEPA's PSA on lawn care, local college students and broadcasting classes can be used to assist in the creation of a PSA. PSAs are often aired for no charge on local cable access channels or radio stations, although time slots may not be ideal.

## 6.3.3 Program Activities for Targeted Audiences

In order to prioritize our outreach and education activities, stakeholders identified the following targeted audiences to increase awareness of watershed issues, inform them of potential solutions, and motivate them to act.

### *Children/Students*

#### Curricula and Training

The Chicago Wilderness Corporate Council's Teaching Academy is a program that provides technical assistance to teachers to help prepare localized curricula relevant to natural resources in the area. The Project WET Curriculum and Activity Guide contains 91 multidisciplinary water-related activities for students in grades K to 12. The guide features cross-reference and planning charts, a glossary and background material on activity development and field testing. Main program contacts include: Kane-DuPage Soil & Water Conservation District;[192] 630-584-7961, Ext. 3; The Chicago Wilderness Corporate Council, Teaching Academy,[193] 312-580-2137; Project WET,[194] 866-337-5486; The Conservation Foundation, Judy Fitchett, 630-428-4500 Ext. 11.

**Recommendations: The Ferson-Otter Creek Watershed Coalition should support:**

- **strategies to implement water science curriculums into classrooms and training opportunities for teachers that will increase their capacity to incorporate concepts of water science in their environmental education classrooms;**
- **growth of students' awareness of water-related employment opportunities and educational criteria.**

#### Watershed Quilt Project[195]

The Watershed Quilt Project is a grassroots project inspired by the Nature Quilt Project in Macomb, Illinois.[196] Our local version of the project builds on recommendations of the recent Aux Sable Creek Watershed Plan that recommends introducing the concepts of watersheds and stormwater in the classroom as well as working on programs with children such as precipitation monitoring, runoff tracing, stream monitoring and analysis, and habitat assessments.

The Project's mission is raising awareness of the assets, opportunities and challenges in our local natural areas to gain a better understanding of the interconnectedness between people and the natural world around them through children's education. This project accomplishes this through promoting outdoor environmental education, environmental literacy, the arts, cultural discovery and activism demonstrating the ability of children to make a positive difference in addressing global environmental challenges. Main program contacts include: Aux Sable Creek Coalition, Watershed Quilt Project, Joan Soltwisch, 815-690-3658.

[192] "Kane-DuPage Soil and Water Conservation District," Kane-DuPage SWCD, accessed December 20, 2011, http://www.kanedupageswcd.org/.
[193] "Chicago Wilderness," Chicago Wilderness, accessed December 20, 2011, http://www.chicagowilderness.org/.
[194] "Worldwide Water Education," Project Wet, accessed December 20, 2011, http://www.projectwet.org/.
[195] "Watershed Quilt Project," Aux Sable Creek Watershed, accessed December 20, 2011, www.auxsablecreekwatershed.org/watershedquiltproject.html.

**Recommendation: The Watershed Quilt Program should be implemented in the Ferson-Otter Creek Watershed in the next five years.**

### Agriculture in the Classroom

USDA Agriculture in the Classroom (AITC) supports state programs by providing a network that seeks to improve agricultural literacy — awareness, knowledge, and appreciation — among PreK-12 teachers and their students. The program is carried out in each state, according to state needs and interests, by individuals representing farm organizations, agribusiness, education and government. In Illinois, the AITC program is coordinated by the Illinois Farm Bureau and County Ag Literacy Coordinators administer the program locally.

**Recommendation: The AITC program should be implemented or expanded in the Ferson-Otter Creek Watershed in the next 5 years.**

### World Water Monitoring Day™

World Water Monitoring Day™ is an international education and outreach program that builds public awareness and involvement in protecting water resources around the world by engaging citizens to conduct basic monitoring of their local water bodies.[197] The program is coordinated by the Water Environment Federation and the International Water Association. Sponsors include the USGS, USEPA, PerkinElmer, Sinclair Knight Merz, ITT Corporation, and Smithfield Foods. Groups can purchase test kits on the World Water Monitoring Day website. Basic test kits include one set of hardware and enough reagents to conduct up to 50 rounds of testing for pH, dissolved oxygen, temperature, and turbidity. The Classroom kit includes five sets of hardware and enough reagents to conduct up to 50 rounds of testing for pH, dissolved oxygen, temperature and turbidity. Main program contacts include: Water Environment Federation,[198] 703-535-5264.

**Recommendation: Ferson-Otter Creek Watershed Coalition should participate in World Water Monitoring Day in the next three-five years.**

### Envirothon Competition

The Envirothon is an exciting, fun way for high school students to learn about the environment. It combines in-class curriculum with hands-on field experiences, while demonstrating the role people have in important environmental issues, such as forestry and wildlife management, water quality, and soil erosion. At the completion of the year-long learning process, the Envirothon conducts a series of competitions where students are tested on five subjects: soil, aquatics, wildlife, forestry and a specific environmental issue, which changes from year to year. The Illinois Envirothon competition is co-sponsored by the Association of Illinois Soil & Water Conservation Districts (AISWCD), local Soil & Water Conservation Districts (SWCD) and cooperating conservation partners. Main program contacts include: Kane-DuPage Soil & Water Conservation District,[199] 630-584-7961, Ext. 3.

**Recommendation: The Ferson-Otter Creek Watershed Coalition should encourage participation in the program by each high school in the watershed in the next three-five years.**

### The Mighty Acorns®

The Mighty Acorns® program incorporates classroom curriculum, hands-on restoration activities and exploration as it seeks to provide our children with multiple, meaningful, sustained interactions with the land. Students use the land as an outdoor laboratory for learning science and, at the same time, the ecosystems benefit from their restoration work. Mighty Acorns® is a stewardship-based curriculum for 4th-6th graders. Classes adopt a natural area in their community and visit it throughout the school year in order to participate in stewardship activities. Each field trip is preceded by a classroom lesson on related ecological concepts. Summer nature camps for Mighty Acorns® have also been developed through partnerships between The Conservation Foundation and local park districts. Main program contacts include: The Conservation Foundation,[200] 630-428-4500.

**Recommendation: School districts and park districts within the Ferson-Otter Creek Watershed should implement the Mighty Acorns program within the next five years.**

## *Landowners/Homeowners Associations*

### Conservation @ Home

Conservation @ Home is a program created by The Conservation Foundation which is geared towards homeowners. The program encourages and recognizes property owners who protect and/or create yards that are environmentally friendly and conserve water. This includes planting native vegetation, creating butterfly and rain gardens, and removing invasive species. Conservation @ Home is appropriate for outreach to municipalities, park districts, homeowners and homeowner associations through seminars, workshops, one-on-one conversations and the distribution of printed materials. Main program contacts include: The Conservation Foundation,[201] 630-428-4500.

### Presentations

Stakeholders believe the watershed would benefit from providing a variety of topics to present to Homeowners Associations throughout the watershed. The topics might include a series of presentations covering the following topics: soil testing/ fertilizer, benefits of native plants, establishing no mow zones, detention ponds, rain barrels/gardens, etc. A variety of agricultural and natural resource topics are available through the KDSWCD Community Assistance program and The Conservation Foundation. Main program contacts include: The Conservation Foundation,[202] 630-428-4500; .Kane-DuPage Soil & Water Conservation District (KDSWCD),[203] 630-584-7961, Ext. 3.

### Partners for Conservation

Partners for Conservation provides technical and financial assistance (cost-share) to landowners to address erosion issues. The Kane-DuPage Soil and Water Conservation District administers this program with funding provided by the State of Illinois through the Illinois Department of Agriculture. Practices on agricultural land include: Grassed waterways, grade stabilization structures, water & sediment control basins, filter strips, nutrient management, etc. Practices not specific to agricultural land include: Streambank stabilization and restoration, well sealing, rain gardens, and special projects (non-traditional practices such as urban stormwater basin retro-fitting). Main program contacts include: Kane-DuPage Soil & Water Conservation District,[204] 630-584-7961, Ext. 3.

### Events/Conferences

The Coalition could promote its message about improving water quality in the Ferson-Otter Creek Watershed by attending and distributing information at existing events/ conferences or by creating their own event (watershed tour, an environmental fair, or a listening session). The Coalition would benefit from the opportunities to talk to residents and gauge their understanding of water quality concerns as well as hear their concerns about the watershed. In an

[197] "World Water Monitoring Day," WEF and IWA, accessed December 20, 2011, http://www.worldwatermonitoringday.org/.
[198] Ibid.
[199] "Kane-DuPage Soil and Water Conservation District," Kane-DuPage County SWCD, accessed December 20, 2011, http://www.kendallswcd.org/.
[200] "The Conservation Foundation," The Conservation Foundation, accessed December 20, 2011, http://www.theconservationfoundation.org/.
[201] Ibid.
[202] Ibid. 207.
[203] Ibid 206.
[204] "The Conservation Foundation," The Conservation Foundation, accessed December 20, 2011, http://www.theconservationfoundation.org/.

effort to pool resources, share ideas, and provide technical assistance, the Coalition might also pursue coordinating a session at a larger, regional conference. Professionals are encouraged to attend workshops and conferences hosted by government agencies or non-profit water-quality groups. Main program contacts include: The Conservation Foundation,[205] 630-428-4500.

### River Sweep

A river sweep is a coordinated, periodic clean-up of area waterways. The purpose is to create a connection between people and the river by having volunteers remove trash and debris from the river. A community-coordinated river sweep can involve a number of stakeholders, from students to corporations. The river sweep can also help develop a stewardship program to restore natural areas by removing invasive species. A central coordination entity should be established. Funding for supplies is available through the IEPA SCALE grant program. Main program contacts include: The Conservation Foundation,[206] 630-428-4500 and Friends of the Fox, 815-356-6605.

### Storm drain stenciling

Storm drain stenciling involves volunteers painting a stenciled message on or near a storm drain as well as distributing literature explaining what they are doing. Stenciling is a way of explaining nonpoint source pollution to the general public and connecting volunteers and residents to the environment. The program has two target audiences: the crew of volunteers who stencil and those who read the message, "Dump no Waste – Drains to River." Various groups can participate in stenciling, youth groups, homeowners associations, and businesses. Main program contacts include: The Conservation Foundation,[207] 630-428-4500; .Kane-DuPage Soil & Water Conservation District,[208] 630-584-7961, Ext. 3.

## *Decision Makers/Municipal Officials*

### Policy, Codes, and Ordinance Review

By utilizing the USEPA's "Water Quality Scorecard: Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scale," and "Managing Wet Weather with Green Infrastructure," municipalities increase awareness and receive guidance about the process of removing barriers, revising and creating codes, ordinances, and incentives to better protect water quality. This process can be formally facilitated by agencies like the Chicago Metropolitan Agency for Planning (CMAP), or structured as a peer-to-peer roundtable. Topics may include: restoring wetlands; maintaining natural drainage areas for water quality and water supply benefits and reduced flooding; deicing practices and products; etc. Main program contacts include: The Chicago Metropolitan Agency for Planning,[209] (CMAP) 312-454-0400.

### Regional Planning

Developing a regional floodplain management plan has many potential benefits of the plan including: improvement of public safety; reduction of flood damage costs to communities; increase in resources for local flood safety programs; opportunities for reduced flood insurance rates for communities participating in FEMA's Community Rating System; improvement of riparian vegetation, wildlife habitat and water quality; preservation of historical land uses; retention of natural beauty of the area. Main program contacts include: Federal Emergency Management Agency, National Flood Insurance Program,[210] 800-611-6122.

[205] Ibid.
[206] Ibid. 211.
[207] Ibid. 211.
[208] "Kane-DuPage Soil and Water Conservation District," Kane-DuPage SWCD, accessed December 20, 2011, http://www.kanedupageswcd.org/.
[209] "Chicago Metropolitan Agency for Planning," CMAP, accessed December 20, 2011, http://www.cmap.illinois.gov/.
[210] "Community Rating System," FEMA, accessed December 20, 2011, http://www.fema.gov/business/nfip/crs.shtm.

### WaterSense Program

For local governments, partnering with WaterSense provides access to tools and resources to promote and educate residents the need for water efficiency. Using water more efficiently makes sense for consumers, communities, and the environment. Water efficiency measures, as part of broader conservation efforts, can help reduce water and wastewater infrastructure costs and ensure resources for future generations.

In some areas the growing population is putting stress on water supplies and distribution systems, threatening human health and the environment. The average household uses 100+ gallons of water each day. Water supply has become a national priority. The WaterSense website states that at least 36 states are anticipating local, regional, or statewide water shortages by 2013. Using water more efficiently, will help preserve supplies for future generations and protect the environment. WaterSense makes it easier to identify water-efficient products and practices. Main program contacts include: Environmental Protection Agency, Water Sense Program,[211] 866-987-7367.

### Technical Workshops

Municipal and county planners, engineering and public works staff members could participate in technical workshops. Topics would be chosen that address water quality issues, particularly fecal coliform, presented by the Kane-DuPage Soil and Water Conservation District as well as The Conservation Foundation. Main program contacts include: The Conservation Foundation,[212] 630-428-4500; .Kane-DuPage Soil & Water Conservation District,[213] 630-584-7961, Ext. 3.

### Natural Resource Information (NRI) Reports

The Kane-DuPage Soil and Water Conservation District provides natural resource information to officials of the local governing body and other decision makers. The Natural Resource Information (NRI) report intends to present the most current natural resource information available in an understandable format for sites that are being considered for development. It contains a description of the present conditions and resources available and their potential impact on each other. Main program contacts include: Kane-DuPage Soil & Water Conservation District,[214] 630-584-7961, Ext. 3.

### Soil Erosion & Sediment Control

Soil Erosion & Sediment Control expertise provided by the Kane-DuPage Soil and Water Conservation District to agencies (IEPA, United States Army Corps of Engineers) and local governments (County and Municipal Government) as part of a cooperative agreement. Main program contacts include: Kane-DuPage Soil & Water Conservation District,[215] 630-584-7961, Ext. 3.

### Natural Resources Conservation Service (NRCS) Conservation Programs

NRCS's natural resources conservation programs help people reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. Public benefits include enhanced natural resources that help sustain agricultural productivity and environmental quality while supporting continued economic development, recreation, and scenic beauty. The Coalition could help encourage landowners to utilize NRCS programs, especially those that help reduce the potential for fecal coliform

[211] "Water Sense," U.S. EPA, last modified November 2, 2011, accessed November 7, 2011, http://www.epa.gov/WaterSense/index.html.
[212] "The Conservation Foundation," The Conservation Foundation, accessed December 20, 2011, http://www.theconservationfoundation.org/.
[213] "Kane-DuPage Soil and Water Conservation District," Kane-DuPage SWCD, accessed December 20, 2011, http://www.kanedupageswcd.org/.
[214] "Kane-DuPage Soil and Water Conservation District," Kane-DuPage SWCD, accessed December 20, 2011, http://www.kanedupageswcd.org/.
[215] Ibid.

bacteria loadings in local steams. Main program contacts include: US Department of Agriculture, Natural Resources Conservation Service[216] and Kane-DuPage Soil & Water Conservation District, 630-584-7961, Ext. 3.

A list of all education and outreach recommendations are in Appendix E.

[216] "Natural Resources Conservation Service," USDA NRCS, accessed December 20, 2011, http://www.nrcs.usda.gov/.

# 7. PLAN IMPLEMENTATION AND MONITORING

## 7.1 SCHEDULE AND MILESTONES

Although there is considerable merit in producing a watershed plan, improving water quality in the watershed will be a result of implementing the plan's project, policy, and education and outreach recommendations in a meaningful way. Improving water quality will happen over time and with considerable effort by the stakeholders, partner agencies, local governments, and residents alike.

### 7.1.1 Project Recommendations

All short-term lead implementers estimate a 2016 project completion date. It should be noted that implementation of any of these projects is based on a variety of factors including, but not limited to, securing appropriate funding and participation from willing landowners and local governments.

***The milestone for project recommendations is development of at least 10 grant applications to implement projects within the 5-year/short-term planning timeframe.***

### 7.1.2 Policy Recommendations

In addition to project recommendations, the watershed plan also describes numerous policy recommendations. As this plan was written on the premise of a 5-year planning cycle, identified parties are encouraged to consider and implement the plan's policy recommendations by 2016. To help facilitate these efforts, CMAP or other consultants can provide assistance to communities for those recommendations that are related to comprehensive plans and ordinances, such as incorporating CMAP's Model Water Use Conservation Ordinance. Furthermore the Ferson-Otter Creek Watershed Coalition should continue to work with the watershed's communities to support this effort.

***The milestone for policy recommendations is the adaptation of at least 3 of the recommended measures by each municipality within the 5-year planning timeframe.***

### 7.1.3 Education and Outreach Recommendations

The outreach and education recommendations will be an on-going effort with partnering agencies, homeowners associations, and other relevant groups that are active within the watershed. The pace of implementation of the outreach and education recommendations would be greatly increased by the hiring of a part-time watershed coordinator.

## 7.2 FUNDING OPTIONS

Plan implementation is largely based on the availability of funding for projects and other plan recommendations. Table 28 describes possible funding sources that may be used to move forward with plan implementation.

**Table 28. Funding sources**

| PROGRAM | FUNDING AGENCY | TYPE | FUNDING AMOUNT | ELIGIBILITY | ACTIVITIES FUNDED | WEBSITE |
|---|---|---|---|---|---|---|
| WATER QUALITY | | | | | | |
| Capitalization Grants for Clean Water State Revolving Funds | U.S. EPA/Office of Wastewater Management | Loan revolving fund | No limit on wastewater funds; Drinking water up to 25% of available funds | Local government, Individuals, Citizen groups, Not-for-profit groups | Wastewater treatment; Nonpoint source pollution control; Watershed management; Restoration & protection of groundwater, wetlands/riparian zones, and habitat. | http://www.epa.gov/owm/cwfinance/index.htm |
| Non-point Source Management Program (319 grants) | Illinois EPA | Matching Grant (60% funded) | No set limit on awards | Local government, Businesses, Individuals, Citizen & environment groups | Controlling or eliminating non-point pollution sources; Stream bank restoration; Pesticide and fertilizer control. | http://www.epa.state.il.us/water/financial-assistance/non-point.html |
| Illinois Green Infrastructure Grant Program for Stormwater Management | Illinois EPA | Matching Grant Minimum Local MatchCSO: 15%; Retention and Infiltration: 25% Green Infrastructure Small Projects: 25% | Up to: CSO: $3M or 85% of project costs; Retention and Infiltration: $750,000 or 75% of project costs; Green Infrastructure Small Projects: $75,000 or 75% of project costs | Any entity that has legal status to accept funds from the state of Illinois, including state and local governmental units, nonprofit organizations, citizen and environmental groups, individuals and businesses | Green infrastructure best management practices (BMPs) for stormwater management to protect or improve water quality. | http://www.epa.state.il.us/water/financial-assistance/igig.html |
| Sustainable Agriculture Grant Program | Illinois Department of Agriculture | Matching Grant (60% funded) | — | Organizations, governmental units, educational institutions, non-profit groups, individuals | Practices are aimed at maintaining producers' profitability while conserving soil, protecting water resources and controlling pests through means that are not harmful to natural systems, farmers or consumers. | http://www.agr.state.il.us/Environment/conserv/index.html |
| Streambank Stabilization and Restoration Program | Illinois Department of Agriculture | Matching grant (amount funded not specified) | — | Landowners, Citizen groups, Not-for-profit groups | Naturalized streambank stabilization in rural and urban communities, work with SWCD | http://www.agr.state.il.us/Environment/conserv/index.html |
| Conservation Innovation Grants | Natural Resources Conservation Service | Matching grant (50% funded) | Up to $75,000 under State Component | Landowners, Organizations | Projects targeting innovative on-the-ground conservation, including pilot projects and field demonstrations. | http://www.il.nrcs.usda.gov/programs/cig/ |
| HABITAT | | | | | | |
| Partners for Fish and Wildlife Habitat Restoration Program | Department of Interior, U.S. Fish and Wildlife Service | Cost-share (50% funded) | up to $25,000 | Private landowners | Voluntary restoration or improvements of native habitats for fish and wildlife; Restoration of former wetlands, native prairie stream and riparian areas and other habitats | http://www.fws.gov/policy/640fw1.html |
| Bring back the Natives Grant Program | National Fish and Wildlife Foundation | Matching Grant (33% funded) | Varies with project ($50,000-$75,000) | Not-for-profit groups, Universities, Local governments | Restoration of damaged or degraded riverine habitats and native aquatic species through watershed restoration and improved land management. | http://www.nfwf.org/AM/Template.cfm?Section=charter_programs_list&CONTENTID=18473&TEMPLATE=/CM/ContentDisplay.cfm |
| Wildlife Habitat Incentives Program | U.S. Department of Agriculture | Grant, Matching Grant (at least 75% funded) | — | Private landowners, Not-for-profit groups | Establishment and improvement of fish and wildlife habitat on private land. | http://www.nrcs.usda.gov/programs/whip/ |
| Native Plant Conservation Initiative | National Fish and Wildlife Foundation | Matching Grant (50% funded) | $10,000-$50,000 | Community and watershed groups, Nonprofit groups Educ. institutions, Conservation districts, Local governments | "On-the-Ground" projects that involve local communities and citizen volunteers in the restoration of native plant communities. | http://www.nfwf.org/programs/npci.htm |
| WETLANDS | | | | | | |
| Wetlands Reserve Program | USDA NRCS | Direct contracts with landowners; Easement (100%); Cost Share and 30 year easements (75%) | No set limit on awards | Individual Citizen groups, Not-for-profit groups | Wetlands restoration or protection through easement and restoration agreement | http://www.nrcs.usda.gov/programs/wrp/states/il.html |
| Wetlands Program Development Grants | U.S. EPA | Matching Grant (75% funded) | No set limit on awards | Not-for-profit groups; Local government | Developing a comprehensive monitoring and assessment program; Improving the effectiveness of compensatory mitigation; Refining the protection of vulnerable wetlands and aquatic resources | http://www.epa.gov/owow/wetlands/grantguidelines |
| Northeastern Illinois Wetlands Conservation Account | U.S. Fish and Wildlife Service/ The Conservation Fund | Grant/Matching Grant (50% match strongly suggested) | Average of ~$38,000 | A partnership of: Governmental agencies; Not-for-profit conservation groups; Private landowners | Restoration of former wetlands; Enhancement and preservation of existing wetlands; Creation of new wetlands Wetlands education and stewardship | http://www.conservationfund.org/node/133 |
| Small Grants Program | North American Wetlands Conservation Council | Matching Grant | Up to $75,000 | A partnership of: Governmental agencies, Not-for-profit conservation groups; Private landowners | Long-term acquisition, restoration, enhancement of natural wetlands | http://www.fws.gov/birdhabitat/Grants/NAWCA/index.shtm |
| Wetland Restoration Fund | Openlands | Grant | $5,000-$100,000 | Local government; Not-for-profit groups; Citizen groups; Other organizations | Wetlands and other aquatic ecosystem restorations within the six-county Chicago region on land under conservation easement or owned by a government agency | |
| Five Star Restoration Program | National Fish and Wildlife Foundation | Matching Grant (50% funded) | One-year projects: $10,000-$25,000; Two-year projects: $10,000 -$40,000 | Any public or private entity that can receive grants | Seeks to develop community capacity to sustain local natural resources for future generations by providing modest financial assistance to diverse local partnerships for wetland and riparian habitat restoration | http://www.nfwf.org/AM/Template.cfm?Section=Charter_Programs_List&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=60&ContentID=17901 |
| PRIVATE | | | | | | |
| Tellabs | Tellabs Foundation | Grant | At least $10,000 | Not-for-profit groups | Environmental protection and improvement programs; Organizations which protect the environment | http://www.ivp.tellabs.com/about/foundation.shtml |
| GVF Core Program | Grand Victoria Foundation | Grant/Matching Grant | Varies with scope of project, size of organization, other funding | Not-for-profit groups | Preservation and restoration of natural lands and waterways | www.grandvictoriafdn.org |

## 7.3 MONITORING FOR SUCCESS

### 7.3.1 In-stream Sampling

As stated throughout the plan, fecal coliform is the watershed's only identified impairment (specifically in Ferson Creek). Although the Illinois 303 (d) list has identified urban runoff and storm sewers, and runoff from forests, grasslands and parks as potential sources of the impairment, there is still uncertainty as to where geographically in the watershed and from what origin (sewage treatment plants, septic system, pet waste, wildlife, drain tiles, etc.) the contamination derives. Absent this information, this watershed plan covers a variety of potential sources through recommendations aimed at reducing the concentration of fecal coliform in the watershed (public outreach and education, policy, projects).

For this reason, more detailed and frequent monitoring should be implemented throughout the Ferson Creek Watershed by 2016. The Ferson-Otter Creek Watershed Coalition should partner with Fox River Study Group (FRSG) and Illinois State Water Survey (ISWS) to develop a more robust water quality monitoring scheme with a goal of achieving an improved understanding of the sources of fecal coliform within the watershed. Developing a better baseline to understand fecal coliform issues will allow for evaluation of the effectiveness of implementation efforts over time. To that end, water samples that indicate a positive change or trend towards lower fecal coliform concentrations and ultimately, compliance with the water quality standard, will provide the best criteria to measure success.

After monitoring data are collected and analyzed with conclusive results as to where and from what origin the fecal coliform contamination is coming from, the Ferson-Otter Creek Watershed Coalition can reevaluate the plan's recommendations and make appropriate adjustments to priorities at that point. Additionally there are several efforts to collect more water quality data already happening throughout the Fox River Basin. The Ferson-Otter Creek Watershed Coalition should work closely with these organizations and partner on monitoring projects as funding and resources are available.

### 7.3.2 Effluent Monitoring

As stated, only one NPDES permit is issued within the watershed and that is to Ferson Creek Utilities Sewage Treatment Plant (STP) to treat domestic wastewater for the majority of the Windings Subdivision in St Charles.[217] The permit does outline water quality standards for fecal coliform. It is inconclusive to date if the STP has had any fecal coliform violations. It is recommended that the Ferson-Otter Creek Watershed Coalition partner with the management at the STP to prevent any potential future violations.

## 7.4 NEXT STEPS

With the initial planning cycle closing at the end of 2011 with approval of the new watershed plan, attention will turn to implementation in 2012. Full plan and executive summary documents will be printed and distributed during the first quarter of 2012. Access to these documents will also be available via both CMAP and FREP websites. CMAP will approach local governments and request a resolution of support for the watershed plan. CMAP and TCF will maintain contact with the new Ferson-Otter Creek Watershed Coalition and support their implementation efforts where possible.

A list of all figures and tables is found in Appendix F and Appendix G respectfully.

[217] NPDES ID number IL0045411.

Appendix A
List of Long-term Project Recommendations for Ferson-Otter Creek Watershed Plan

| Project Number | IEPA Category | Best Management Practices (BMPs) | Lead Implementer(s) |
|---|---|---|---|
| 22 | **AGRICULTURE** | Meissner-Corron Forest Preserve– block selected drain tiles, fill or divert overgrown farm ditches, remove tree along ditches, plant deep-rooted native species, stabilize area to ensure Nature Preserve protection. | Kane County Forest Preserve District |
| 23 | **AGRICULTURE** | Primrose Farm-stream bank stabilization, stream bottom evaluation. | St. Charles Park District |
| 24 | **HYDROLOGIC** | Install water level control structure & drain tile improvements to allow water level management of wetland to control cattails in high quality wetland. Cost estimate: $50,000. | Deer Run East HOA |
| 25 | **HYDROLOGIC** | Culvert under Empire Road, west of Boxwood Lane. Utilize green infrastructure to stabilize channel. | Kane County |
| 26 | **HYDROLOGIC** | Otter Creek Forest Preserve – support purchase of adjacent lands, remeander stream out of ditch banks, recreate wetlands across 50+ acres. | Kane County Forest Preserve District |
| 27 | **HYDROLOGIC** | Fitchie Creek Forest Preserve- remove trees along creek banks, stabilize creek banks, install small-scale engineered BMPS in creek, control reed canary grass, and plant deep-rooted native species. | Kane County Forest Preserve District |
| 28 | **HYDROLOGIC** | Hazelcrest Subdivision-severe erosion issue. | Kane County Forest Preserve District/ Lily Lake |
| 29 | **HYDROLOGIC** | Lenkaitis Farm-streambank stabilization. | Landowner |
| 30 | **HYDROLOGIC** | Work with developer/landowner to permanently protect 30+ acres of high quality wetland on 54 acre property (north of 64, west of West Mary Drive). Only 20 acres of property is buildable (not wetland or floodplain). | Landowner |
| 31 | **HYDROLOGIC** | Streambank Stabilization Project; landowner at 36W394 Wild Rose Lane; Moderate erosion (< 4 foot banks). Total feet: 375. Cost estimate: $25,000. | Landowner |
| 32 | **HYDROLOGIC** | Drainage improvements to reduce residential flooding (east of Denker Road, south of Deerhaven Trail). Cost estimate: $25,000. | Landowner |
| 33 | **HYDROLOGIC** | Work with developer/landowner to permanently protect sedge meadow wetland, which is the headwaters to Fitchie Creek. | Landowner |
| 34 | **HYDROLOGIC** | Ravine stabilization at the Windings Subdivision (near end Harvest Lane, St. Charles). | Windings HOA |
| 35 | **HYDROLOGIC** | Work with developer/landowner to restore former wetland complex that is headwaters of Ferson Creek. Wetland is also located in major aquifer recharge area (west of Anderson Road, south of 64). | Landowner/ Village of Lily Lake |
| 36 | **HYDROLOGIC** | Stream maintenance for survey stations: 430-1150, 850-1100, 10050-10270, and 10630-10850. This is 4 separate projects. Project details for each project (station, length, erosion, action, cost, and priority) in Attachment A. Total feet: 1410. Accumulative cost estimate: $84,600-$105,751. | South Elgin |
| 37 | **HYDROLOGIC** | Ferson Creek Park-naturalized buffer. | St. Charles Park District |
| 38 | **HYDROLOGIC** | Otter Creek Bend Wetland-soil deposition mitigation. | St. Charles Park District |
| 39 | **HYDROLOGIC** | Floodplain forest / stream corridor restoration to remove invasive/nuisance species on Wild Rose Springs HOA property; Wild Rose Springs owns more than 60 acres of natural area along Ferson Creek and more than 1 mile of stream. Cost estimate: $100,000. | WildRose Springs HOA |
| 40 | **HYDROLOGIC** | Ravine stabilization at the Windings Subdivision (near Eagle Court, St. Charles). | Windings HOA |
| 41 | **HYDROLOGIC** | Ravine stabilization at the Windings Subdivision (near Ravine Drive in between Forest Glen Lane and Jens Jensen Lane, St. Charles). | Windings HOA |
| 42 | **HYDROLOGIC** | Ravine stabilization at the Windings Subdivision (near Ravine Drive, northwest of Kingswood Drive St. Charles). | Windings HOA |
| 43 | **HYDROLOGIC** | Ravine stabilization at the Windings Subdivision (near west of Ravine Drive, south of Empire Road, St. Charles). | Windings HOA |
| 44 | **HYDROLOGIC** | Ravine stabilization at the Windings Subdivision (near southeast intersection of Bridle Court and Paddock Lane, St. Charles). | Windings HOA |
| 45 | **HYDROLOGIC** | Ravine Stabilization at the Windings Subdivision (near Bridle Court, south of Steeplechase Road, St. Charles) | Windings HOA |

| | | | |
|---|---|---|---|
| 46 | **HYDROLOGIC** | Ravine Stabilization at the Windings Subdivision (near end of Paddock Lane, St. Charles). | Windings HOA |
| 47 | **LIVESTOCK** | Lenkaitis Farm-vegetative filter strip, updating manure pit. | Landowner |
| 48 | **LIVESTOCK** | Encourage farmer to install animal exclusion zone from swale, which drains 32 acres through cow pasture; Cows observed defecating in small swale apparently fed by upstream drain tile that discharges to tributary to Ferson Creek(south of Willowbrook Drive, east of Corron Road). Cost estimate: $5,000. | Landowner |
| 49 | **LIVESTOCK** | Investigate what type of farming operation and the extent, if any, of agriculture feed lot runoff from animal operation; headwaters to Bowes Creek (south of Plato Road, east of Pease Road). | USDA/Farm Bureau/Landowner |
| 50 | **OTHER** | Monitor water quality of Ferson Creek at Corron Road. | Campton Hills |
| 51 | **OTHER** | Restore oak woodland/savanna on Campton Township Gray Willows property. Total acreage: 21. Cost estimate: $25,000. | Campton Township |
| 52 | **OTHER** | Restore 9+ acres of farmed wetland on Campton Township Gray Willows Property. Total acreage: 9. Cost estimate: $25,000. | Campton Township |
| 53 | **OTHER** | Install water level control structure on existing tile to facilitate wetland restoration on Campton Township Gray Willows Farm property. Cost estimate: $8,000. | Campton Township |
| 54 | **OTHER** | Monitor water quality in the Otter Creek Tributary to Ferson Creek. | Homeward Glen, Campton Hills |
| 55 | **OTHER** | Remove dense stands of Phragmites from along Randall Rd - US 20 interchange swales; source of invasive seeds from farthest north end of Otter Creek. Total acreage: 0.75. Cost estimate: $7,500. | Illinois Department of Transportation (IDOT) |
| 56 | **OTHER** | Develop and implement stream corridor management program to remove debris jams, nuisance & invasive species (east of Prairie Springs Drive); Adjacent landowners have expressed willingness to help. Cost estimate: $20,000. | Kane County Forest Preserve District |
| 57 | **OTHER** | Remove invasive species (Phragmites) spreading across constructed wetland basin; develop and implement vegetative management plan to maintain wetland quality (east of Prairie Springs Drive). Adjacent landowners have expressed willingness to help Kane County Forest Preserve District. Cost estimate: $15,000. | Kane County Forest Preserve District |
| 58 | **OTHER** | Kane County wetlands adjacent to Lake Campton-investigate drainage ditch constructed under Whitney road from the wetlands to the west end of Lake Campton. | Lake Campton POA, Kane County Forest Preserve District, St. Charles School District 303 |
| 59 | **OTHER** | Ferson Creek upstream from Lake Campton-Creek walk to assess potential stabilization and other improvements. | Lake Campton POA, St. Charles School District 303 |
| 60 | **OTHER** | Eroded Banks, further investigation needed (southwest corner of Silver Glen Road and Burr Road) | Landowner |
| 61 | **OTHER** | Work with landowner to preserve as much of 25 acre oak woodland as possible (north of Lenz Road, east of Crawford Road). | Landowner |
| 62 | **OTHER** | Work with landowners and Girl Scout Organization to permanently protect stream corridor & oak woodlands. Site includes HHQ ADID wetland with T&E species (south of Woodgate Road, east of Burr Road). | Landowner |
| 63 | **OTHER** | Work with landowner to maintain and permanently protect oak woodland and undeveloped fen recharge area (south of Burr Road Lane, west of Burr Road). | Landowner |
| 64 | **OTHER** | Protect Fen #1272 from development and insure water quality BMPs are integrated into all development proposed within its recharge area. | Landowner |
| 65 | **OTHER** | Restore Lily Lake and pre-settlement wetlands (north and south of Route 64), total acreage 18. | Lily Lake/Developer |
| 66 | **OTHER** | Streambank erosion monitoring for survey stations: 0-12270. This is 48 separate projects. Project details for each project (station, length, erosion, action, cost, and priority) in Attachment A. Total feet: 6,805. | South Elgin |
| 67 | **OTHER** | Vegetative Maintenance for survey stations: 2990-3080, 3160-3330, 4120-4870, 5380-5580, 5760-5880, 6170-6320, 7500-7610, 9240-9420, and 10870-11370. This is 10 separate projects. Project details for each project (station, length, erosion, action, cost, and priority) in Attachment A. Total feet: 2,260. Accumulative cost estimate: $169,750-$283,750. | South Elgin |
| 68 | **URBAN** | Retrofit existing turf bottom detention basin with native plants - minimum 25,000 square feet. Cost estimate: $10,000 | Burlington School District 301 -Prairie View Grade School |

| | | | |
|---|---|---|---|
| 69 | **URBAN** | Streambank and stream channel stabilization of Tucker Run along north side of Gray Willows Open Space Property; about 600 ft and 8 riffle grade control structures. Cost estimate: $96,000. | Campton Township |
| 70 | **URBAN** | Streambank and stream channel stabilization of Ferson Creek through the Gray Willows Open Space Property; about 2500 ft and 20 riffle grade control structures. Cost estimate: $250,000. | Campton Township |
| 71 | **URBAN** | Retrofit existing dry-bottom detention basins with native vegetation for increased filtering/pollutant removal. 11 projects in total along parts of Spinnaker Street, Umbdenstock Road, Mission Hills Street, Foxmoor Road, Country Water Road, Amber Street, Bowes Road, Hopps Road, Deerpath Road. | Elgin |
| 72 | **URBAN** | Detention basin retrofit to ease flooding concerns and water quality benefits (east of Tuscan View Drive, south of College Green Drive). | Landowner |
| 73 | **URBAN** | Work with landowner to establish water quality BMP basin between Stony Creek and landscape business / farm animal stalls to filter runoff (west of Crawford Road, north of McDonald Road). | Landowner / USDA-NRCS |
| 74 | **URBAN** | Install infiltration-based BMPs (pavers, bioretention basins, etc.) retrofits into strip mall development; significantly undersized detention storage and no water quality treatment before discharge to Otter Creek (west of Randall Road, north of South Street). Cost estimate: $500,000. | Landowner/Shopping Center Corporation |
| 75 | **URBAN** | Install infiltration-based BMPs (pavers, bioretention basins, etc.) retrofits into strip mall development; significantly undersized detention storage and no water quality treatment before discharge to Otter Creek (north of South Street, west of Edgewood Street). Cost estimate: $450,000. | Landowner/Shopping Center Corporation |
| 76 | **URBAN** | Detention Basin Retrofit; replant turf grass bottom basin with native plants for added pollutant removal; Otter Creek Shopping Mall east side of Randall Rd. Total acreage: 1.1. Cost estimate: $15,000. | Landowner/Shopping Center Corporation |
| 77 | **URBAN** | Retrofit existing turf bottom detention basin with native plants-mesic prairie garden (north of Bolcum Road, east of Burr Road). Total feet: 6,000. Cost estimate: $85,000. | School District 303 |
| 78 | **URBAN** | Install rain garden to infiltrate/filter Ferson Creek Elementary roof runoff before uncontrolled release to Ferson Creek. Project could also serve as outdoor education classroom for students. Cost estimate: $85,000. | School District 303, Ferson Creek Elementary |
| 79 | **URBAN** | Work with strip mall owner to install retrofit water quality BMPs to reduce total runoff and/or parking lot pollutants prior to discharge into downstream storm sewer, Target, Randall Road. 2 locations. | South Elgin/Elgin |
| 80 | **URBAN** | Work with strip mall owner to install retrofit water quality BMPs to reduce total runoff and/or parking lot pollutants prior to discharge into downstream storm sewer, Best Buy/Home Depot, Randall Road | South Elgin |
| 81 | **URBAN** | Work with strip mall owner to install retrofit water quality BMPs to reduce total runoff and/or parking lot pollutants prior to discharge into downstream storm sewer, Caputos, Randall Road. | South Elgin |
| 82 | **URBAN** | Work with strip mall owner to install retrofit water quality BMPs to reduce total runoff and/or parking lot pollutants prior to discharge into downstream storm sewer, Kohls, Randall Road. | South Elgin |
| 83 | **URBAN** | Work with strip mall owner to install retrofit water quality BMPs to reduce total runoff and/or parking lot pollutants prior to discharge into downstream storm sewer, TRU/Ross, Randall Road. | South Elgin |
| 84 | **URBAN** | Re-grade w/Stone Toe &/or Gabion at survey stations: 5450-5570, 5980-6100, 9440-9500, and 10300-10630. This is 5 separate projects. Project details for each project (station, length, erosion, action, cost, and priority) in Attachment A. Total feet: 610. Accumulative cost estimate: $91,500-$197,250. | South Elgin |

Appendix B
Comparative municipal ordinance review results from Center for Watershed Protection's Codes and Ordinance Worksheet (COW).

| | COMMUNITY A | SCORE | COMMUNITY B | SCORE | COMMUNITY C | SCORE | COMMUNITY D & E | SCORE | CENTER FOR WATERSHED PROTECTION COW[1] | MAX SCORE |
|---|---|---|---|---|---|---|---|---|---|---|
| Street width (local access) | 24' | 0 | 26' | 0 | N/A | 0 | >22 | 4 | 18-22' | 4 |
| Queuing | No | 0 | No | 0 | N/A | 0 | No | 0 | Yes | 3 |
| Street length | Yes | 1 | No | 0 | N/A | 0 | Yes | 1 | Minimize | 1 |
| ROW width for minor roads | 66' | 0 | 66' | 0 | N/A | 0 | 66' | 0 | <45' | 3 |
| Allow utilities under paved part of ROW? | Yes | 1 | Yes | 1 | N/A | 1 | Yes | 1 | Yes | 1 |
| Culs-de-sac radii | 60' | 0 | 45.5' | 0 | N/A | 0 | 60' | 0 | <35' or <45' | 3 |
| Require landscaped island? | Yes | 1 | Yes | 1 | N/A | 1 | Yes | 1 | Yes | 1 |
| Allow alternative turn-arounds? | Yes | 1 | No | 0 | N/A | 0 | Yes | 1 | Yes | 1 |
| Curb and gutter required? | No | 2 | Yes | 0 | N/A | 0 | No | 2 | No | 2 |
| Established swale criteria? | Yes | 2 | Yes | 2 | N/A | 0 | Yes | 2 | Yes | 2 |
| Parking ratio, professional office | 4.0 | 0 | 3.0 | 0 | N/A | 0 | 2.5 | 1 | <3 | 1 |
| Parking ratio, shopping center | 5.0 | 0 | 4.0 | 1 | N/A | 1 | 3.3 | 1 | <4.5 | 1 |
| Parking ratio, single family detached | 4.0 | 0 | 2.0 | 1 | N/A | 1 | 2.0 | 1 | <2 | 1 |
| Max rather than min? | No | 0 | No | 0 | N/A | 0 | No | 0 | Yes | 2 |
| Promote shared parking? | Yes | 1 | Yes | 1 | N/A | 1 | Yes | 1 | Yes | 1 |
| Provide model shared parking agreements? | No | 0 | No | 0 | N/A | 0 | Yes | 1 | Yes | 1 |
| Reduce parking ratios w/ shared parking? | No | 0 | Yes | 1 | N/A | 1 | Yes | 1 | Yes | 1 |
| Parking ratio reduced near transit? | No | 0 | No | 0 | N/A | 0 | Yes | 1 | Yes | 1 |
| Parking stall width | 9' | 1 | 9' | 1 | N/A | 1 | 9' | 1 | <9 | 1 |
| Stall length | 18.0 | 1 | 18.0 | 1 | N/A | 0 | 18' | 1 | <18 | 1 |
| Smaller dimensions for compact cars? | No | 0 | No | 0 | N/A | 0 | No | 0 | Yes | 1 |
| Pervious area for spillover parking? | Yes | 2 | Yes | 2 | N/A | 2 | Yes | 2 | Yes | 2 |
| Incentives for structured parking? | Yes | 1 | No | 0 | N/A | 1 | No | 0 | Yes | 1 |
| Minimum landscaping for parking lots? | Yes | 2 | Yes | 2 | N/A | 2 | Yes | 2 | Yes | 2 |
| Bioretention islands allowed? | Yes | 2 | Yes | 2 | N/A | 2 | Yes | 2 | Yes | 2 |
| Cluster development allowed? | Yes | 3 | No | 0 | N/A | 3 | Yes | 3 | Yes | 3 |
| Land conservation or impervious cover a major goal of open space design ordinance? | Yes | 1 | — | 0 | N/A | 0 | Yes | 1 | Yes | 1 |
| Additional submittal or review requirements for CD? | No | 1 | — | 0 | N/A | 1 | No | 1 | No | 1 |
| By-right form of development? | No | 0 | — | 0 | N/A | 0 | Yes | 1 | Yes | 1 |
| Flexible site design criteria? | Yes | 2 | — | 0 | N/A | 2 | Yes | 2 | Yes | 2 |
| Irregular lot shapes allowed? | Yes | 1 | No | 0 | N/A | 1 | Yes | 1 | — | 1 |
| Front setback for 0.5 acre residential lot | 25.0 | 0 | 40.0 | 0 | N/A | 0 | 35' | 0 | <20' | 1 |
| Rear setback for 0.5 acre residential lot | 30.0 | 0 | 50.0 | 0 | N/A | 0 | 35' | 0 | <25' | 1 |
| Min. side setback for 0.5 acre residential lot | 7.5 | 1 | 10'-15' | 0 | N/A | 0 | 10' | 0 | <8' | 1 |
| Frontage for 0.5 acre residential lot | 75.0 | 2 | 100'-125' | 0 | N/A | 0 | 125' | 0 | <80' | 2 |
| Min. sidewalk width | 4.0 | 2 | 4.0 | 2 | N/A | 2 | 4.0 | 2 | <4' | 2 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Required on both sides of street? | No | 2 | Yes | 0 | N/A | 0 | No | 2 | No | 2 |
| Sloped to drain to yard, not street? | No | 0 | No | 0 | N/A | 0 | No | 0 | Yes | 1 |
| Substitute alternate pedestrian networks? | Yes | 1 | No | 0 | N/A | 1 | Yes | 1 | Yes | 1 |
| Minimum driveway width? | 18.0 | 2 | — | ? | N/A | 2 | 18' | 2 | <9' | 2 |
| Can pervious materials be used? | Yes | 2 | Yes | 2 | N/A | 2 | Yes | 2 | Yes | 2 |
| Use two-track design? | No | 0 | Yes | 1 | N/A | 1 | Yes | 1 | Yes | 1 |
| Shared driveways permitted in residential developments? | Yes | 1 | Yes | 1 | N/A | 0 | Yes | 1 | Yes | 1 |
| Require association to manage common open space? | Yes | 2 | No | 0 | N/A | 2 | Yes | 2 | Yes | 2 |
| Require consolidation of open space? | Yes | 1 | No | 0 | N/A | 0 | Yes | 1 | Yes | 1 |
| Keep percentage of open space in natural condition? | No | 0 | No | 0 | N/A | 0 | Yes | 1 | Yes | 1 |
| Uses defined for open space? | Yes | 1 | Yes | 1 | N/A | 0 | Yes | 1 | Yes | 1 |
| Allow management of open space by third party? | Yes | 1 | Yes | 1 | N/A | 1 | Yes | 1 | Yes | 1 |
| Discharge roof runoff to yard? | Yes | 2 | Yes | 2 | N/A | 2 | Yes | 2 | Yes | 2 |
| Allow temporary ponding on yard or roof? | Yes | 2 | Yes | 2 | N/A | 2 | Yes | 2 | Yes | 2 |
| Stream buffer ordinance? | Yes | 2 | Yes | 2 | N/A | 2 | Yes | 2 | Yes | 2 |
| Minimum buffer width? | — | — | — | — | N/A | 0 | 15' | — | <75' | 1 |
| Include wetlands, steep slope, and floodplain? | Yes | 1 | Yes | 1 | N/A | 1 | Yes | 1 | Yes | 1 |
| Require native vegetation in buffer? | Yes | 2 | Yes | 2 | N/A | 2 | Yes | 2 | Yes | 2 |
| Ordinance outline allowable uses in buffer? | Yes | 1 | Yes | 1 | N/A | 1 | Yes | 1 | Yes | 1 |
| Buffer ordinance specifies education and enforcement? | Yes | 1 | Yes | 1 | N/A | 0 | Yes | 1 | Yes | 1 |
| Preserve natural vegetation on residential lots? | Yes | 2 | Yes | 2 | N/A | 2 | Yes | 2 | Yes | 2 |
| Clear trees from septic field? | No | 1 | — | — | N/A | 0 | No | 1 | No | 1 |
| Require tree conservation? | Yes | 2 | No | 0 | N/A | 2 | Yes | 2 | Yes | 2 |
| Limits of disturbance on construction plans adequate to prevent clearing? | Yes | 1 | Yes | 1 | N/A | 1 | Yes | 1 | Yes | 1 |
| Incentives for conserving non-regulated land? | Yes | 2 | No | 0 | N/A | 2 | No | — | Yes | 2 |
| Flexibility to meet regulatory requirements? | Yes | 2 | No | 0 | N/A | 2 | Yes | 2 | Yes | 2 |
| Require water quality treatment for stormwater? | Yes | 2 | Yes | 2 | N/A | 0 | Yes | 2 | Yes | 2 |
| Effective design criteria for BMPs? | Yes | 1 | Yes | 1 | N/A | 1 | Yes | 1 | Yes | 1 |
| Discharge stormwater directly into wetland without pretreatment? | No | 1 | No | 1 | N/A | 0 | No | 1 | No | 1 |
| Restrict or prohibit development in 100 yr. floodplain? | Yes | 2 | Yes | 2 | N/A | 2 | Yes | 2 | Yes | 2 |
| **Total** | | **71** | | **44** | | **54** | | **78** | | **100** |

1 Center for Watershed Protection, Code and Ordinance Worksheet

**Appendix C**

*Ferson-Otter Creek Watershed Plan Regional Resources*

Chicago Wilderness
The Chicago Metropolitan Agency for Planning
The Conservation Foundation
The Delta Institute
Friends of the Fox
Fox River Ecosystem Partnership
Fox River Study Group
Illinois Department of Natural Resources
Illinois Environmental Protection Agency
Illinois State Water Survey
The Morton Arboretum
National Council for Public Partnerships
National Resource Conservation Service
Openlands
Peggy Notebaert Nature Museum
Pizzo & Associates
United States Department of Agriculture
United States Environmental Protection Agency
United States Fish and Wildlife Service
United States Geological Survey
University of Illinois Extension

*Local Resources*

Equestrian Groups
Faith-based Organizations
Homeowners Associations
Kane County Drainage District
Kane County Farm Bureau
Kane County Forest Preserve District
Kane County Health Department
Kane County Soil & Water Conservation District
Libraries
Park Districts
Parks and Recreation Departments
Property Owners Associations
Sanitary Districts/Wastewater Treatment Plants
Schools
Scouting Organizations
Municipalities
Township Offices

**Appendix D**
*Outreach List for Potential Ferson-Otter Creek Watershed Coalition Members*

Campton Township, Highway Commissioner
Campton Township, Parks and Open Space Coordinator
Campton Township, Supervisor
City of Elgin, City Engineer
City of Elgin, City Manager
City of Elgin, Director of Community Development
City of Elgin, General Services Group Director for Public Works
City of Elgin, Mayor
City of Elgin, Parks and Recreation Coordinator
City of Elgin, Parks and Recreation Director
City of Elgin, Senior Engineer
City of St. Charles, City Administrator
City of St. Charles, Mayor
City of St. Charles, President
City of St. Charles, Project Coordinator - Mapping
City of St. Charles, Public Works Director
City of St. Charles, Public Works Engineering Manager
Deer Run East Property Owners Association
Elgin Community College, Managing Director of Facilities
Elgin Township, Supervisor
Forest Preserve District Kane County, Director of Natural Resources
Forest Preserve District Kane County, Executive Director
Fox River Study Group
Geosyntec Consultants
Illinois Department of Natural Resources (IDNR)
IDNR, Ecosystem Administrator
IDNR, Stream Specialist
Illinois State Water Survey
Judson University
Kane County, Board Member
Kane County Environmental Management, Facilities, Subdivisions, and Environmental Resources
Kane County Environmental Management, Subdivision/Project Manager
Kane County Environmental Management, Watershed Engineer
Kane County Farm Bureau, Director
Kane County Forest Preserve District, Director of Planning and Development
Kane County Forest Preserve District, Nature Programs Manager
Kane County, Board Chairman
Kane County, Development
Kane County, Development and Community Services Director
Kane County, Water Resources Director
Kane-DuPage Soil and Water Conservation District, Resource Conservationist
Lake Campton Property Owners Association
Lake Campton Residents
Natural Resources Conservation Service-Kane County
Pizzo and Associates
Private Landowners
St. Charles Park District, Superintendent of Parks and Planning
St. Charles Park District, Director of Parks and Recreation
St. Charles Park District, Manager of Natural Areas
St. Charles Park District, Manager of Nature Programs and Interpretive Services
St. Charles Township, Supervisor
Stony Creek Landowner
The Conservation Foundation Advisory Council Members
The Conservation Foundation Ambassadors
The Conservation Foundation Members
The Windings Subdivision
Thornwood Homeowners Association, President
Trotter and Associates
Village of Campton Hills, Environmental Resource Management Committee
Village of Campton Hills, Plan Commission Chairperson
Village of Campton Hills, Public Works Committee Chairperson
Village of Campton Hills, Village President
Village of Lily Lake, Village Clerk
Village of Lily Lake/ Engineering Resources Association
Village of South Elgin, Community Development Director
Village of South Elgin, Parks and Recreation Director
Village of South Elgin, Planner
Village of South Elgin, President
Village of South Elgin, Public Works Director
Village of South Elgin, Village Administrator
Wild Rose Subdivision
Wills Burke Kelsey Association
Witness Tree Native Landscapes, Inc.

## Appendix E

*List of Policy and Education and Outreach Recommendations*

## Appendix F
List of Figures

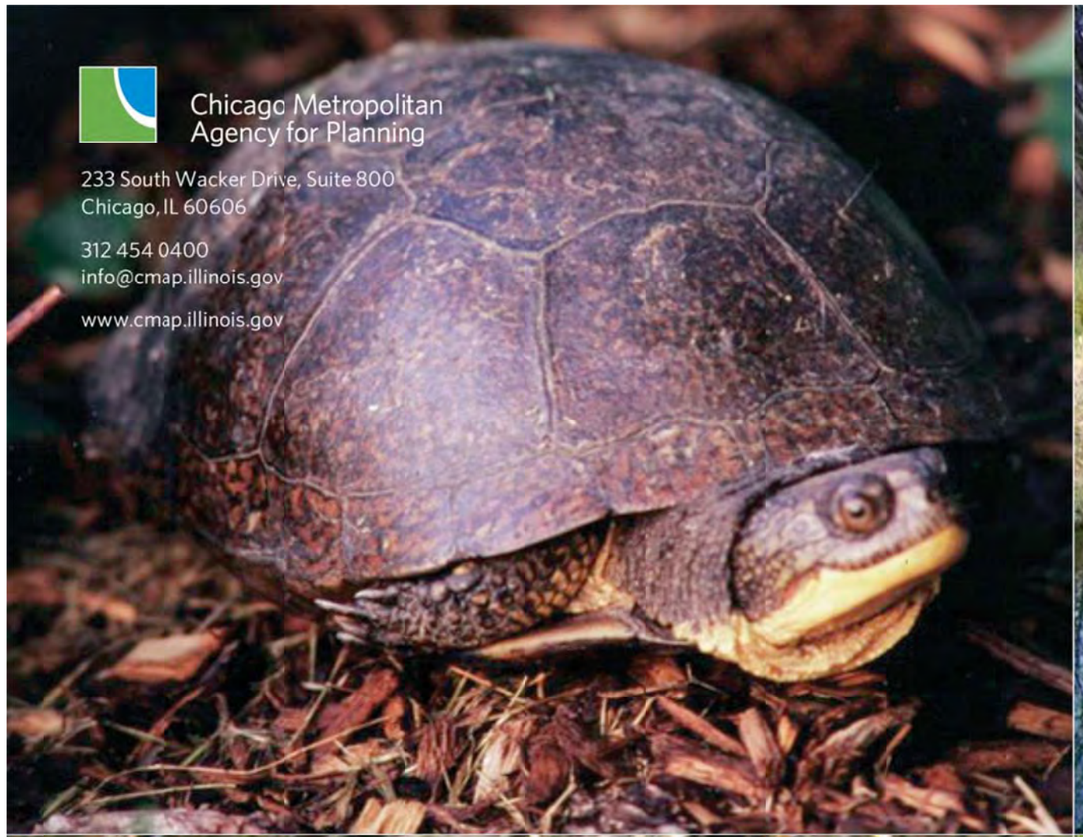
## Appendix G
*List of Tables*

December 2011

## About CMAP

The Chicago Metropolitan Agency for Planning (CMAP) is the region's official comprehensive planning organization. Its GO TO 2040 planning campaign is helping the region's seven counties and 284 communities to implement strategies that address transportation, housing, economic development, open space, the environment, and other quality of life issues. See **www.cmap.illinois.gov** for more information.

Additional back cover photography: Blanding's Turtle - Jack Shouba, Campton Township, Deer Run East HOA; Mussel survey in Otter Creek - Rob Linke, FREP/FRSG/Deer Run Creek HOA



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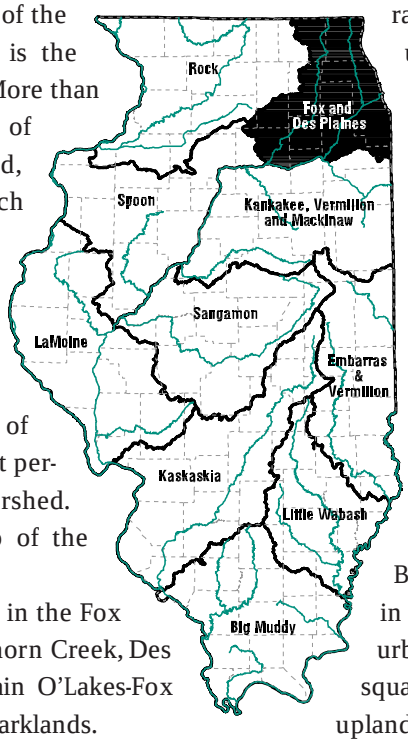
CHAPTER FIVE

# Fox and Des Plaines Rivers Watershed

Located in the northeastern part of the state, the Fox and Des Plaines is the most urbanized ISIS watershed. More than one-third of the area consists of urbanized and developed land, accounting for one-half of such land cover in the state. The watershed has the most non-forested wetland acres in the state as well as the highest percentage of wetland in a watershed. It also has the least amount of cropland acreage and the smallest percentage of cropland in a watershed. (See page 104 for a color map of the watershed's land cover.)




Five Resource Rich Areas are in the Fox and Des Plaines watershed — Thorn Creek, Des Plaines River, DuPage River, Chain O'Lakes-Fox River, Illinois Beach and Prairie Parklands.

- Thorn Creek is a relatively small area — 32 square miles in a heavily urbanized area. Natural resources are confined along streams and in forest preserves. The Thorn Creek Nature Preserve has narrow ridges and deep ravines, shallow depressions, broad uplands and the stream valley.
- The Des Plaines River RRA is a small — 68 square miles — highly urbanized site which forms a narrow corridor along the river from just west of Chicago to Joliet. Relatively high percentages of upland woods and non-forested wetlands occur at this site. Important natural features include prairie, savanna, river bluffs, cliffs, wetland, floodplain and upland forest.
- The DuPage River RRA, comprised of the watershed of the East Branch of the Du Page River, is located in the highly urbanized western suburbs of Chicago. With its small size (81 square miles) it has a high percentage of upland forest (19%) and non-forested wetlands (3%).
- The Chain O'Lakes-Fox River RRA (447 square miles) encompasses the area of most recent glaciation in Illinois. Significant natural features include glacial landforms, natural lakes, and

*The watershed has the most non-forested wetland acres in the state as well as the highest percentage of wetland in a watershed.*

***Table 18.*** *Watershed Land Cover*

| Land Cover | Acres | Percent of Watershed | | Statewide Percentage* | |
|---|---|---|---|---|---|
| Upland forest | 290,149 | 11.3% | (4) | 7.0% | (7) |
| Grassland | 326,288 | 12.7% | (8) | 5.1% | (10) |
| Non-forested wetlands | 78,237 | 3.1% | (1) | 22.0% | (1) |
| Bottomland forest | 26,448 | 1.0% | (9) | 3.0% | (10) |
| Water | 36,275 | 1.4% | (5) | 7.3% | (7) |
| Urban/built-up | 931,664 | 36.3% | (1) | 49.8% | (1) |
| Cropland | 877,925 | 34.2% | (10) | 4.1% | (10) |
| Total acreage | 2,566,987 | 100.0% | | 7.1% | (9) |

** The watershed's percentage of the land cover type statewide, e.g., 7% of the state's upland forests are located in this watershed. Note: the watershed's rank (1st-10th) is shown in parentheses.*

*Most fish richness measures were also close to statewide averages and habitat quality was slightly higher than the statewide average.*

many types of wetland — bogs, fens, seeps, and shallow and deep marshes. Some rare species and community types are limited in their distribution to this area of the state. Urban expansion from the Chicago metropolitan region continues to put severe pressure on the natural resources here.

- Even though its boundaries include urbanized areas of the Chicago metropolitan region, the Illinois Beach RRA (77 square miles) is one of the most ecologically rich and unique areas in Illinois. Its location on the shores of Lake Michigan provides a diversity of habitats that support a wide variety of plants and animals. Significant and unusual topographic features include beaches, ridges and swales, and dunes. The area is an important migratory route for birds.
- The dominant feature of the Prairie Parklands RRA is the recently created Midewin National Tallgrass Prairie, the nation's first federally designated tallgrass prairie, at the former Joliet Arsenal. Significant natural resources include prairies, wetlands and streams. The largest concentration of upland sandpipers in the state is in the Prairie Parklands area. The RRA takes in 239 square miles — 41% in this watershed and 59% in the Kankakee/Vermilion/Mackinaw watershed.

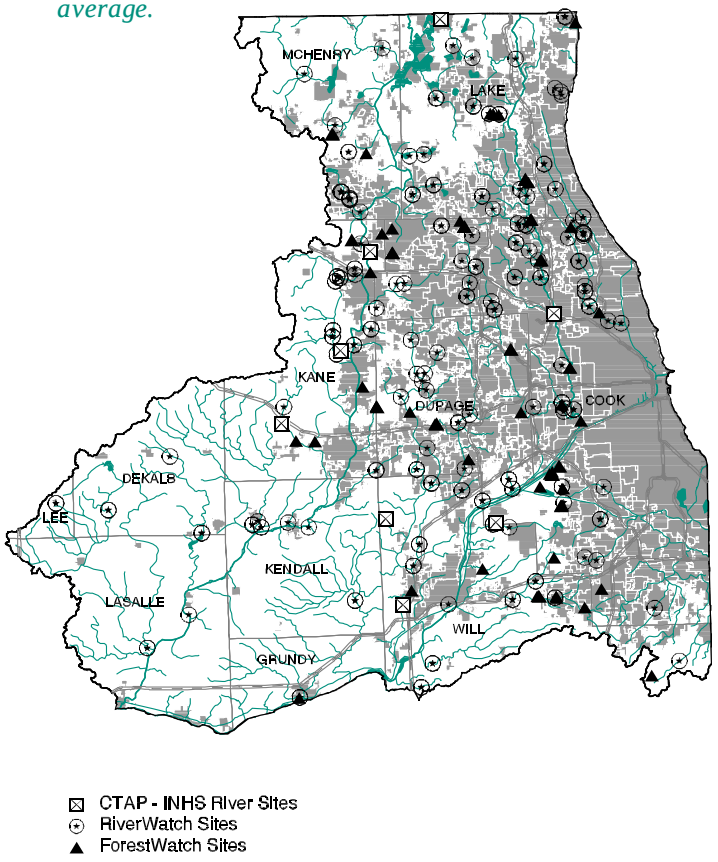



***Figure 35.*** *Monitoring sites*

## ECOSYSTEM MONITORING

HBI values at the eight sites sampled by CTAP biologists indicate moderate organic enrichment, while EPT richness was slightly below the statewide average. Most fish richness measures were also close to statewide averages and habitat quality was slightly higher than the statewide average. One high quality stream was Ferson Creek below Kane County's Leroy Oaks Forest Preserve; it had high habitat quality, good EPT and HBI scores, and high fish richness. The lowest quality site was Willow Creek at Rosemont. It supported no EPT species, relatively low fish richness, and had a very low habitat quality score.

RiverWatch volunteers collected 313 samples at 139 sites on 91 streams. Most RiverWatch biological indicator data also suggest the watershed is below-average in ecological quality. It ranked seventh and eighth among the ten watersheds in MBI and EPT taxa, suggesting that organic pollution has disturbed sensitive taxa. It ranked fifth in taxa richness — with 9.1 taxa per site, slightly above the state average of 8.9 — but seventh in taxa dominance. Sowbugs and hydropsychid caddisfly are the most common taxa.

***Table 19.*** *Watershed Indicator Scorecard*

| Indicator | Watershed Value | Statewide Value | Watershed Ranking |
|---|---|---|---|
| *Macroinvertebrates* | | | |
| HBI | 5.1 | 5.2 | 5 |
| MBI | 6.0 | 5.7 | 7 |
| EPT richness | 6.6 | 7.1 | 6 |
| EPT taxa (RW) | 2.2 | 2.6 | 8 |
| Taxa richness | 9.1 | 8.9 | 5 |
| Taxa dominance | 80.4% | 80.4% | 7 |
| *Fish* | | | |
| Native fish | 14.3 | 13.6 | 4 |
| Darter richness | 1.8 | 1.9 | 5 |
| Exotic species | 0.3 | 0.2 | 6 |
| *Habitat* | | | |
| Habitat score | 94.9 | 88.6 | 4 |

***Table 20.*** *MBI Values*

| Statistic | 1995 | 1996 | 1997 | 1998 | 1999 | Overall |
|---|---|---|---|---|---|---|
| Mean | 6.65 | 5.91 | 6.11 | 5.95 | 5.81 | 6.02 |
| Standard deviation | 1.78 | 0.92 | 0.98 | 1.02 | 0.97 | 1.02 |
| Minimum | 4.23 | 4.84 | 4.52 | 3.63 | 3.47 | 3.47 |
| Maximum | 9.44 | 9.97 | 9.50 | 11.00 | 8.80 | 11.00 |
| Number of sites* | 10 | 40 | 63 | 110 | 83 | 306 |

* *Only samples with at least 25 organisms were included in the analysis.*

ForestWatch volunteers monitored 14 sites in the Fox and Des Plaines Rivers watershed in the fall of 1998. Ten were upland forests (4 oak-hickory, 4 maple-ash-basswood, 2 bur oak) and four were bottomland forests (2 ash-elm-maple, 1 ash-cottonwood, 1 scrub). Tree species richness ranged from four to 16 species per site, averaging 10.2 per site, slightly below the statewide average of 11.8 species per site. The site with only four species was dominated by hawthorn trees and was characterized as scrub. Thirty-eight tree taxa were recorded in the watershed (75 taxa statewide).

The great abundance of buckthorn recorded here is alarming. This non-native invasive woody plant is particularly abundant in northeastern Illinois and seems to be a problem throughout the watershed. It grows in both shrub and tree form, spreads rapidly and crowds out native vegetation, reducing the diversity of the forest and the ability of native plants and animals to survive.

In general, the trees that were most abundant also had the highest basal areas and importance values (Table 21). Buckthorn is an exception. Since it is an understory tree it does not grow very large and is only ninth in basal area and seventh in importance value. In contrast, white oak trees grow very large. Despite being seventh in abundance, they have the greatest basal area and are third in importance.

Two upland sites showed some signs of maple takeover. The site graphed in Figure 36 shows that sugar maples dominate the smallest size class, indicating poor regeneration by oaks and hickories and the possible future dominance of maples. This likely reflects changes in the fire regime in the area.

***Table 21.*** *Tree Species with the Highest Importance Values*

| Importance Value | Species | % of total trees counted (n=1,943) | % of total basal area ($22.1 m^2$/ha) |
|---|---|---|---|
| 30.6 | Ash | 14% | 16% |
| 22.9 | Basswood | 11% | 11% |
| 20.7 | White oak | 6% | 19% |
| 15.5 | Hawthorn | 9% | 3% |
| 15.4 | Bur oak | 3% | 11% |
| 13.7 | Slippery elm | 7% | 5% |
| 13.5 | Buckthorn | 14% | 3% |
| 9.0 | Black cherry | 6% | 3% |
| 7.2 | Sugar maple | 3% | 4% |
| 6.7 | Red oak group | 3% | 4% |

There were no signs of gypsy moths or dogwood anthracnose at any site. Anthracnose has not been a problem in northern Illinois but gypsy moths have been entering northeastern Illinois, primarily from Wisconsin, and pose a major threat to forest health.

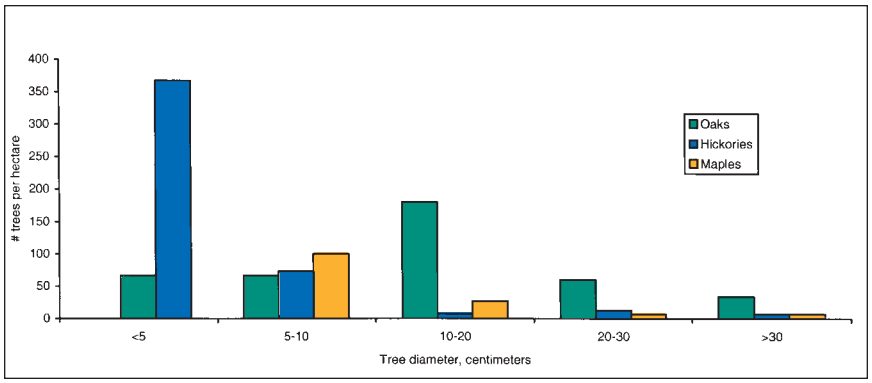



***Figure 36.*** *Maple take-over in an oak-hickory forest*

Abundance of invasive shrubs (primarily non-native) was rather high, comprising 74% of the 1,340 total shrub stems recorded. Honeysuckle shrubs, buckthorn, and European highbush cranberry reached high densities here compared to the statewide average (Fig. 37). Ninety-eight percent of the buckthorn, 60% of the honeysuckle shrubs, 22% of the multiflora rose, and 100% of the cranberry recorded across the state were recorded in this watershed. Buckthorns were found on nine of 14 sites. Two sites were particularly dominated by buckthorn and contributed most of the

buckthorn stems for the watershed and for the state. These numbers are not surprising since this is one of the most populated areas in the state and a major port-of-entry, both of which increase the odds that non-native plants will be introduced.

Spring monitoring also recorded numerous non-natives among the ground cover — ground ivy and garlic mustard were common, with one or both widespread at 10 of the 12 sites monitored. At three of these sites, disturbance-sensitive species were also recorded — blue cohosh and bleeding hearts at one site, and white trillium at two sites. Future monitoring should determine if the disturbance-sensitive species are being replaced by the non-native invasive species.

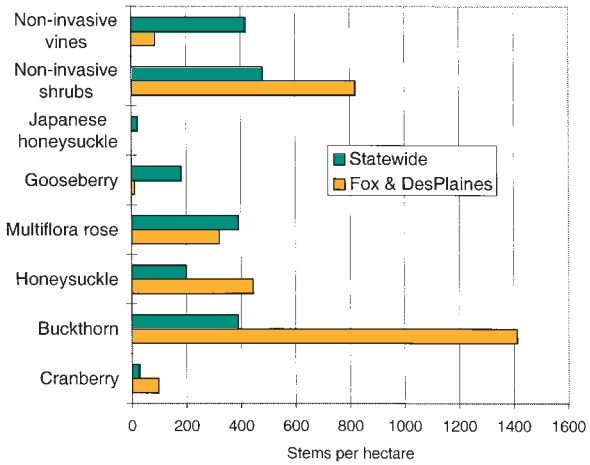


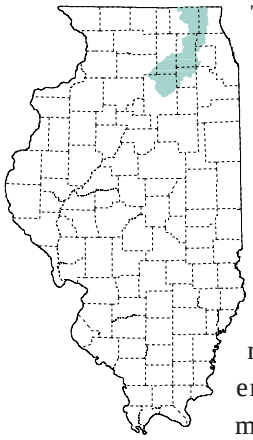

***Figure 37.*** *Number of invasive and non-invasive shrub and vine stems*

*Spring monitoring also recorded numerous non-natives among the ground cover.*

## REGIONAL ASSESSMENTS

*Two regional assessments have been completed for this watershed — the Fox River Basin and the Upper Des Plaines River Basin.*

### *Fox River Basin*



The Fox River, the third largest tributary of the Illinois River, enters Illinois in the northwest corner of Lake County and flows 115 miles south, emptying into the Illinois River at Ottawa. Its basin is about 130 miles long and rarely exceeds 25 miles in width. The basin encompasses 1,720 square miles and includes portions of eleven counties: McHenry, Lake, DeKalb, Kane, Cook, DuPage, LaSalle, Lee, Kendall, Will, and Grundy. The portion of each county within the basin varies from less than 1% (Grundy County) to 74% (Kane County).

Within these counties is a diverse land cover; 19 of the 20 major state land cover categories are represented (only swamps are not found here). At one extreme are DeKalb, Kendall, and LaSalle counties which have 89-94% of their land in agricultural uses and 4-6% in urban uses. At the other extreme is Lake County, where agriculture takes up less than 25% of the land and urban development encompasses 42%. Despite its urban character, Lake County has more wetland acreage than all but three counties in Illinois.

Compared to the rest of the state, the Fox River area has less forest and agricultural land and more wetland. Seventy-two percent of the state's graminoid bog communities and all of the low shrub bogs and forested bogs occur here, as well as four of the state's five fen community types. Geological landforms such as kames, eskers and moraines have also contributed to the area's natural communities — 65% of Illinois' dry gravel prairies and 86% of the gravel hill prairies are found here. Other significant features:

- the 5,506 acres of high quality sites represents 0.5% of the land in the basin and 21% of the total undegraded natural communities in Illinois,
- the watershed has 63 miles of Biologically Significant Streams and 2,204 acres of Biologically Significant Lakes,

- 285,844 acres have been designated a state Resource Rich Area,
- all of the state's undegraded natural lakes are found along the Fox River.

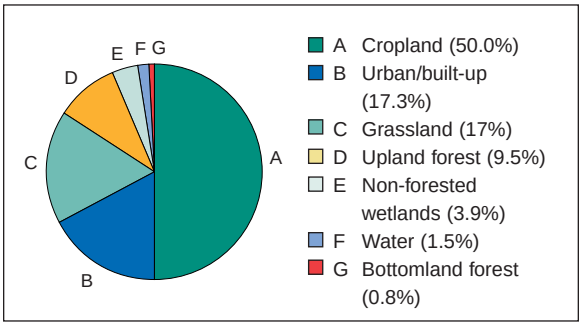



***Figure 38.*** *Fox River basin land cover*

## Plant and animal life

Due to the area's unique ecological diversity, many of the state's plants and animals are found in the basin; some are found nowhere else. From carnivorous pitcher plants and sundews to the diminutive white and yellow lady's slipper orchids, the area has a rich flora, with 102 species listed as state endangered or threatened, and two as federally threatened.

The diverse wetland habitats harbor a rich bird community — herons, waterfowl and geese provide common sightings.This is one of the major areas in Illinois for rare wetland species such as the pied-billed grebe, great egret, king rail, common moorhen, least bittern, yellow-headed blackbird, sandhill crane, and red shouldered hawk.

Basin acreage - 1,092,871 acres
State land*- 8,331 acres
County land - 17,270
Total natural areas - 16,125 acres
High-quality natural areas - 5,506 acres
Nature preserves - 4,425 acres

** Does not include natural areas or nature preserves that may be state owned.*

While most mammal species are fairly common, the pigmy shrew, one of the smallest and rarest shrews in Illinois, has been collected only in the Fox River area.

## Local economy and outdoor recreation

The six main counties through which the Fox River and its tributaries flow — Lake, McHenry, Kane, Kendall, DeKalb, and LaSalle — form one of the most dynamic areas in the state. It is home to 11% of the state's population and is highly urban — only 15% of the residents live in rural areas. Between 1969 and 1994, the Fox River economy grew twice as fast as the rest of the state, supporting 12% of the state's employment and 13% of its personal income. Four of the six counties rank among the top ten in the state in per capita income.

The state operates five major sites in the area: Chain O' Lakes, Shabbona Lake, Silver Springs, and Moraine Hills state parks and Volo Bog Natural Area. Hunting, fishing, boating and nature activities are all popular pursuits here.

## Threats

Prior to European settlement (1820), prairie occupied 31% of the Fox River area and forest 68%. Up until World War II settlements were still rural in character; woodlands, fields, and farms still occupied large areas.The post World War II period, with its flight to the suburbs, changed the composition of the area.With population explosion came habitat loss, degradation, and fragmentation, along with the accompanying invasive and exotic flora and fauna. Trends in the terrestrial community classes of forest, savanna and prairie indicate habitat loss equals or exceeds statewide rates, although the rate of loss for wetlands and natural lakes and ponds is substantially less than statewide.

The watershed can be divided into three distinct segments.The upper Fox, with its many lakes and wetlands, is the most pristine and rich in natural ecosystems, yet is experiencing the greatest population pressure from growth in the northwest Chicago suburbs. The middle Fox is very much an urban river, flowing through six Kane County cities with populations of 15,000-100,000.The challenges in the area include flood control, pollution prevention, and recreation oriented toward the river. Finally, the lower Fox flows through a primarily

*Due to the area's unique ecological diversity, many of the state's plants and animals are found in the basin; some are found nowhere else.*

agricultural landscape and is threatened by soil erosion and chemical runoff from farms.

Urbanization - Urban expansion from the Chicago metropolitan region is putting severe pressure on the natural ecosystems of the region. During the last 20 years, nearly 1,100 miles of new roads have been built in the area, population has grown 30%, and employment and vehicle miles traveled have grown 75%. Urbanized acreage has expanded by 25% in just the last 10 years.

*Although many of the area's natural communities are degraded, they retain relatively high levels of ecological integrity.*

Water pollution - Wastewater treatment standards have greatly improved the quality of the river since the early 1960s, reducing phosphorous concentrations and fecal coliform counts. However, excessive algal blooms are still a concern. If wastewater treatment is not changed in the upcoming decades, it is likely that the growing amount of effluents may halt or reverse the declining trends in phosphorous and fecal coliform bacteria.

Habitat loss and fragmentation - Natural habitats in the area are typically found in small patches separated from each other by agricultural or developed land and this will continue as development pressure mounts. Stream habitat fragmentation has caused the extirpation or declines in fish species.

Flooding - The loss of natural habitats has reduced the water storage and retention abilities in the basin. Urban settings increase runoff and quickly move water into the river through ditches and tributaries. Similarly, intense cultivation lessens the capacity of water to infiltrate the soil and increases the rate of flow into tributaries and, ultimately, the river. Flooding is now a major problem in the area.

## Opportunities

Although many of the area's natural communities are degraded, they retain relatively high levels of ecological integrity and have potential for improvement. For example, forests could be restored in areas where they could potentially have at least a 500-acre core; this would improve habitat for breeding birds. In smaller upland forests, native plant communities could be restored, with shrubby areas and oak trees provided for migrant birds. Managing forests to maintain large snags with exfoliating bark or cavities would provide roosting habitat for forest-dwelling bats and den sites for other mammals, including the southern flying squirrel.

Wetland conservation should also be a high priority because of the relatively large population of threatened and endangered species. Grassland restoration around existing wetlands would provide habitat for declining grassland birds, help buffer wetlands from surrounding development, and provide nesting habitat for many wetland species.

Prairie restoration, coupled with the preservation of native prairie and other grassland habitats, would provide additional habitat for badger and red fox. Restoring native vegetation in the riparian zone along creeks and rivers will not only help wildlife but will also reduce siltation, desiccation, and higher than normal temperatures in the stream. Vegetation will shade the stream, stabilize the banks and filter sediment and chemicals from runoff before they reach the stream.

## *Upper Des Plaines River Basin*

The upper Des Plaines River Basin includes the river basin from the Wisconsin border to the Chicago Sanitary and Ship Canal in Cook County. It drains approximately 346 square miles and includes central Lake, north central Cook and a small portion of DuPage counties. No other natural Illinois river runs through such an urbanized watershed, and yet no other urban river still has so much nature left in and around it.

Scientists estimate that prior to settlement the landscape was 60% forest and savanna and 40% prairie. Wetlands made up a little more than one-quarter of the basin, mostly wet prairie, prairie pothole marsh, sedge meadow, peatland and floodplain forest. Today, urban land takes up more than 40% of Lake County and 75% of Cook County, yet pockets and pieces of natural lands still exist.

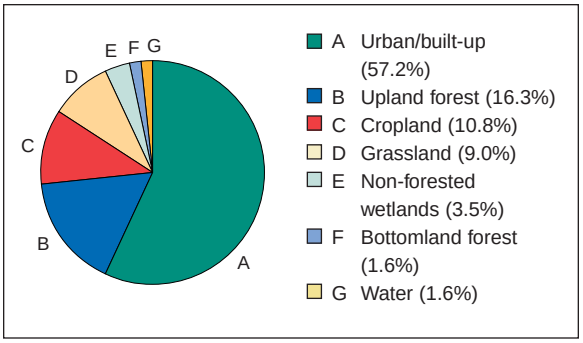



***Figure 39.*** *Upper Des Plaines River basin land cover*

Eighteen percent of the upper Des Plaines basin is woodland. Marshes, wet meadows, and ponds cover 3.5% of the surface with 167 pothole lakes still surviving. The basin contains 63% of the statewide total of northern flatwoods (open woodlands that occur on claypan soil), 10% of the state's calcareous floating mat community (floating mat of sedge peat over a lake or pond), and 7.3% of the state's sedge meadow community. Other significant features:

- the combination of different moisture, terrain, and soil types produce 16 distinct habitat types in the basin; several — bogs, fens, marl flats — are more typical of Canada than Chicago's collar counties;
- high quality natural areas make up 0.2% of the basin; and
- nine nature preserves offer wet prairies, fens, sedge meadows, marsh, oak savanna, and oak woods.

## Plant and animal life

The Upper Des Plaines area has distinctive flora, with some plants such as northern cranesbill and hairy white violet more typical of Canada. Only 662 species of plants have been recorded in the area. Of these, 24 species are listed as state threatened or endangered; the prairie white fringed orchid is also listed as federally threatened.

With its large amount of urban land, the area does not figure importantly as wildlife habitat, although at least 270 of the 300 bird species that occur in Illinois can be found here, as well as 43 species of mammal. Twenty-three species of reptiles and 16 species of amphibians are found here, with the state endangered eastern massasauga occurring in pockets of habitat provided by the many forest preserves and conservation areas. Butterflies and skippers are well known with 109 species documented. Scattered pockets of lupine in the upper Des Plaines area provide food for the federally endangered Karner blue butterfly.

## Local economy and outdoor recreation

The Des Plaines River runs through the heart of Illinois' most urbanized region. Cook and Lake counties encompass merely 2.5% of Illinois' land area, but account for 31% of its urban land and 50% of its population. In the last 120 years, the population of the area grew fourteen-fold. Nearly 99% of residents live in urban areas, and urban land takes up more than 40% of Lake County and nearly three-quarters of Cook County, compared to only 6% for the rest of Illinois.

*The Upper Des Plaines area has distinctive flora, with some plants such as northern cranesbill and hairy white violet more typical of Canada.*

The area employs nearly 3.5 million people with a total income of $150 billion — over half of the jobs and income in Illinois. Most agriculture, which plays only a small part in the economy and land cover, is in specialty crops, commodities that have a high cash value in a region of high land values.

Basin acreage - 221,637
Total natural areas - 2,259 acres
High quality natural areas - 440 acres
Nature preserves - 1,476 acres

The region does not include any state outdoor recreation sites, but it does contain county forest preserves and interpretive centers. The urban character of the area deters hunting; firearm deer hunting is not allowed.

## Threats

Pollution - While surface water pollution has been reduced, water quality is still compromised by hard-to-regulate nonpoint sources such as soils washed into streams from fields and building sites, and de-icing salts from roads. The Illinois Environmental Protection Agency has assessed about a quarter of the upper Des Plaines basin and rates water quality as fair. Mussel diversity, an indicator of water

quality, is also low. Although 18 native species have been reported from the region, only three common species have been found alive since 1963.

Emissions of federally regulated pollutants have also been reduced, although locally produced air pollution (i.e. engine exhaust) is still a problem. Cook and Lake counties are crisscrossed with 10% of the state's roads and they carry 40% of the vehicle-miles traveled in the state.

Modification - Humans have long pre-empted nature as engineers of the watershed — fields have been tiled and wetlands drained. Impounding structures have been installed on natural lakes to stabilize their levels and the lakes now function like artificial impoundments. Low-head dams alter both water level and the movement of sediments, nutrients, and plants and animals in the river channel. Average flows in the Des Plaines are 80% higher today than in the 1940s and 1950s.

*The basin has become an outdoor laboratory for experiments in the restoration and reconstruction of habitats.*

Exotic species - An arkful of non-native animals and plants have been introduced into the basin, often with unintended ecological effects. The rusty crayfish (used as bait) has been dumped into the water and its survivors outcompete the native clearwater crayfish. Ten percent of the vascular plant species now found in the basin are not native to it. Several species of exotic turtles as well as two caimans have been reported in the Des Plaines River — probably discarded pets.

Fragmentation - Construction of roads, fields, and houses divides forests, wetlands, or prairies into small habitat "islands." Forested wetlands in the basin consists of 390 separate tracts, the mean size of which is 7.5 acres. Research suggests that many forest birds need the protection of at least 500 acres of woods to breed successfully. The two largest contiguous forested tracts on the Des Plaines River (near Gurnee and near Libertyville) measure 239 and 106 acres respectively. The largest emergent wetland in the basin covers 355 acres — massive by Illinois standards — but the average is 3.7 acres.

Fire - The extent of savanna in the presettlement basin is thought to be explained in part by the occasional fires that swept the area, recycling nutrients, clearing the ground for new growth, and killing all but the fire-resistant oak species. Without fire to stem plant invaders, savanna becomes dense woods. In deep woods, young maples untouched by fire survive to shade the forest floor. Plants that thrive in the sun — including oak seedlings — languish. As a result, the old oaks in the woods of the upper Des Plaines basin are not reproducing themselves. Mid- and late-summer wildflowers also struggle to bloom after the leafed-out trees block the sun. These effects can be reversed for some flowering plants, such as the state endangered northern cranesbill that occurs in one dryish forest in the basin. Its numbers increase after ground fires are deliberately set to burn off competing plants.

## Opportunities

The basin has become an outdoor laboratory for experiments in the restoration and reconstruction of habitats. For example, the Des Plaines River Wetlands Demonstration Project consists of 450 marshy acres along the river in northern Lake County that have been reconfigured and replanted. The site quickly attracted waterfowl and tests have shown that water quality improved as it progressed through the wetland. Also in Lake County, a damaged savanna is regenerating at Reed-Turner Woodland Nature Preserve. Cutting brush and burning periodically are restoring savanna-like growing conditions in other areas, and plans are underway to link public stream margins, forest preserves, and roadsides with appropriately managed private and commercial sites to create corridors of protected land.

**Otter Creek Stream Restoration, St. Charles**

This project will apply management practices on a segment of Otter Creek, a tributary of Ferson Creek and the Fox River in unincorporated St. Charles Township, to stabilize the eroding streambanks and streambed. These practices will include the stabilization of 3,140 feet of eroding streambanks using bioengineering techniques to stabilize undercut and collapsing banks and narrow over-widened sections of the channel. The work also will include regrading streambanks to a more gradual slope, selective tree removal, native vegetation planting, and erosion control blankets. The management practices will further include streambed stabilization by installing three cross-riffle grade control structures (placing large rocks across stream to reduce downcutting of the streambed and add oxygen to the water) and raising an existing footbridge to reduce the build up of debris caught by the bridge and the resultant scouring of the channel bottom. The management practices will be designed to improve water quality, remove nonpoint source pollutants, enhance habitat and aesthetics, and improve other beneficial hydrologic functions.

## 319 Biannual reports

**Title:** Fox River WRAS Implementation Project
**Purpose:** The project included seven watershed restoration and protection projects as well as watershed-wide project coordination, technical assistance, and continued plan development. A —conservation engineer‖ was hired to provide technical assistance for best development and land management practices throughout the Nippersink Creek ( ILDTK04) watershed, a tributary of the Fox River. The project stabilized 415 feet of eroding streambank along Tyler Creek (ILDTZP02). Approximately 140 feet of eroding streambank along Otter Creek (ILDTF02), a tributary to Ferson Creek and the Fox River, were stabilized and structures were installed to protect the quality of an adjacent 40 acre wetland park (Otter Creek Bend Wetland). A dam located on Brewster Creek (ILDT38) at the Elgin YWCA‘s Camp was removed to restore the impoundment to a meandering stream channel with a 4.9 acre wetland area and riparian buffer of native vegetation. A sediment monitoring program was implemented to demonstrate the effectiveness of the stream restoration and dam removal techniques. A biofiltration system was constructed in the center median of a parking lot in the West Main Street Park to drain and filter runoff to improve water quality by removing heavy metals and nutrients and reducing runoff volume. Stream restoration techniques (coir fiber rolls, A-jacks, lunkers, vegetated geogrids, deep rooted vegetation, and removal of non-native vegetation and undercut trees) were implemented along 5,790 feet of the Fox River and 6,060 feet of seven tributary streams. At Greater Raceway Woods, an existing outlet structure of an impoundment on an unnamed tributary of the Fox River (ILDT20) was modified and streambank and streambed stabilization was implemented along a 2,000 foot segment of the tributary.

**Title:** Fox River Watershed Planning, Restoration, & Protection
**Purpose:** This project continued the implementation of the —Integrated Management Plan for the Fox River Watershed in Illinois.‖ The project included eight watershed restoration and protection projects as well as watershed-wide project coordination and technical assistance. Lake Run Habitat Restoration Project restored a 3,350-foot segment of Long Run, a tributary of Blackberry Creek (ILDTD02), and 41.79 acres of wetlands. Otter Creek Stream Restoration Project stabilized 3,095 feet of eroding streambanks along Otter Creek (ILDTF02), a tributary to Ferson Creek and the Fox River. St. Charles Stormwater Outfall Treatment Basin project constructed a wetland basin to receive and treat stormwater runoff prior to discharge to 7th Avenue Creek, a tributary of the Fox River. Poplar Creek Streambank Restoration Project stabilized 200 feet of eroding streambanks along Poplar Creek (ILDTG02), a tributary of the Fox River. Restoration of Lake Antioch Wetlands & Feedstream

project constructed a stone filter check fence with wetland planting and stabilized 515 feet of eroding streambanks tributary to Lake Antioch. Presbury Lake Shoreline Restoration Project stabilized 925 feet of eroding shoreline along Presbury Lake. Woods Creek Nonpoint Source Control project retrofitted three existing dry bottom detention basins into wetland detention basins, installed native vegetation in ponds and adjacent areas upstream of Woods Creek to enhance pollutant removal, conduct storm drain stenciling, and installed educational signage. Long Lake Shoreline Stabilization Project stabilized 1,667 feet of eroding shoreline along Long Lake (ILRTJ). The Fox River is included on Illinois' 303(d) list. This project executed nonpoint source pollution control recommendations of a watershed-based plan for the Fox River

**Project Location:** Counties of Cook, Kane, & Lake
**Subgrantee:** Northeastern Illinois Planning Commission
222 South Riverside Plaza, Suite 1800
Chicago, Illinois 60606-6097
**Project Reports and Other Informational Materials:**
—Fox River Watershed Planning, Restoration, & Protection – Final Report.‖ December 2007. Chicago Metropolitan Agency for Planning.
**BMP Implementation Summary:**
Estimated Load Reduction
Sediment Phosphorus Nitrogen
BMP Code BMP Name Amount (Tons/Yr.) (Pounds/Yr.) (Pounds/Yr.)
580 Streambank/Shoreline Stabilization 5,887 ft. 451 421 839
584 Stream Channel Stabilization 3,865 ft. 54 53 106
657 Wetland Restoration 41.79 ac. ? 14 84
800 Urban Stormwater Wetland 4 (no.) ? 104 352
840 Grass-Lined Channel 0.55 ac. ? 67 191
910 Rock Outlet Protection 1 (no.) ? ? ?

Otter Cr. IL_PEE-01 0709000509 Medium 15.26 Aquatic Life Cause Unknown
9/4/2003 THORNWOOD OFFICE 847-639-7770 KANE OTTER CK 9/4/2003

Ferson Creek Preserve is a part of a greenbelt and wildlife corridor along Ferson and Otter Creek. In this belt there are extensive floodplains and wetlands, some in fair condition and some needing stabilization and restoration. This has been a co-operative project with the St. Charles Park District and it includes parcels where developers are restoring the land to satisfy Corps of Engineers and Fish & Wildlife mitigation requirements for wetland destroyed in other locations. There is also a high beaver population at Ferson Creek.

## OTTER CREEK/FERSON CREEK WETLANDS

**Location:**

St. Charles Township T40N R8E Sec 7, 8, 17

**Size:** 300 acres

**Natural Resources**
*Communities:*

Sedge meadow (C)
Streamside marsh (C, D)

*Rare Plants:*

none

*Rare Animals:*

none

*Other Significant Features:*

- A large green space with intact creek meanders

**Protection Status:**

- Owned by the St. Charles Park District and the Kane County Forest Preserve District

**Management Problems:**

- Reed canary grass

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Morrall River films

NPDES Permit No. IL0045411
Notice No. DGN:07030601.daa

Public Notice Beginning Date: **April 18, 2007**

Public Notice Ending Date: **May 18, 2007**

National Pollutant Discharge Elimination System (NPDES)
Permit Program

PUBLIC NOTICE/FACT SHEET
of
Draft Reissued NPDES Permit to Discharge into Waters of the State

Public Notice/Fact Sheet Issued By:

Illinois EPA
Division of Water Pollution Control
Permit Section
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276
217/782-0610

Name and Address of Discharger:

Ferson Creek Utilities, Inc.
2335 Sanders Road
Northbrook, Illinois 60062

Name and Address of Facility:

Ferson Creek WWTF
42 W. 371 Hidden Springs Drive
St. Charles, Illinois
(Kane County)

The Illinois Environmental Protection Agency (IEPA) has made a tentative determination to issue a NPDES Permit to discharge into the waters of the state and has prepared a draft Permit and associated fact sheet for the above named discharger. The Public Notice period will begin and end on the dates indicated in the heading of this Public Notice/Fact Sheet. All comments on the draft Permit and requests for hearing must be received by the IEPA by U.S. Mail, carrier mail or hand delivered by the Public Notice Ending Date. Interested persons are invited to submit written comments on the draft Permit to the IEPA at the above address. Commentors shall provide his or her name and address and the nature of the issues proposed to be raised and the evidence proposed to be presented with regards to those issues. Commentors may include a request for public hearing. Persons submitting comments and/or requests for public hearing shall also send a copy of such comments or requests to the Permit applicant. The NPDES Permit and notice numbers must appear on each comment page.

The application, engineer's review notes including load limit calculations, Public Notice/Fact Sheet, draft Permit, comments received, and other documents are available for inspection and may be copied at the IEPA between 9:30 a.m. and 3:30 p.m. Monday through Friday when scheduled by the interested person.

If written comments or requests indicates a significant degree of public interest in the draft Permit, the permitting authority may, at its discretion, hold a public hearing. Public notice will be given 45 days before any public hearing. Response to comments will be provided when the final Permit is issued. For further information, please call Don Netemeyer at 217/782-0610.

The following water quality and effluent standards and limitations were applied to the discharge:

Title 35: Environmental Protection, Subtitle C: Water Pollution, Chapter I: Pollution Control Board and the Clean Water Act were applied in determining the applicable standards, limitations and conditions contained in the draft Permit.

The applicant is engaged in treating domestic wastewater for a majority portion of the Windings Subdivision in St. Charles.

The length of the Permit is approximately 5 years.

The main discharge number is 001. The seven day once in ten year low flow (7Q10) of the receiving stream, Ferson Creek, is 0 cfs.

The design average flow (DAF) for the facility is 0.095 million gallons per day (MGD) and the design maximum flow (DMF) for the facility is 0.238 MGD. Treatment consists of a manually cleaned bar screen, two -stage activated sludge, sedimentation, sand filters, chlorination & dechlorination.

Pursuant to the waiver provisions authorized by 40 CFR ∋ 123.24, this draft permit is within the class, type, and size for which the Regional Administrator, Region V, has waived his right to review, object, or comment on this draft permit action.

Application is made for the existing discharge(s) which is (are) located in Kane County, Illinois. The following information identifies the discharge point, receiving stream and stream classifications:

| Outfall | Receiving Stream | Latitude | Longitude | Stream Classification | Biological Stream Characterization |
|---|---|---|---|---|---|
| 001 | Ferson Creek | 41E 56' 40" North | 88E 26' 30" West | General Use | Not Rated |

To assist you further in identifying the location of the discharge(s) please see the attached map.

The stream segment(s) receiving the discharge from outfall(s) 001 is (are) on the 303 (d) list of impaired waters.

The following parameters have been identified as the pollutants causing impairment:

| Pollutants | Potential Contributors |
|---|---|
| Fecal Coliform | Runoff from forest/grassland/park land and urban runoff/ storm sewers |

The discharge(s) from the facility is (are) proposed to be monitored and limited at all times as follows:

Discharge Number(s) and Name(s): Outfall 001

Load limits computed based on a design average flow (DAF) of 0.095 MGD (design maximum flow (DMF) of 0.238 MGD).

The effluent of the above discharge(s) shall be monitored and limited at all times as follows:

| | LOAD LIMITS lbs/day* DAF (DMF) | | | CONCENTRATION LIMITS mg/L | | | |
|---|---|---|---|---|---|---|---|
| Parameter | Monthly Average | Weekly Average | Daily Maximum | Monthly Average | Weekly Average | Daily Maximum | Regulation |
| $CBOD_5$ | 7.9 (20) | | 16 (40) | 10 | | 20 | 35 IAC 304.120<br>40 CFR 133.102 |
| Suspended Solids | 9.5 (24) | | 19 (48) | 12 | | 24 | 35 IAC 304.120<br>40 CFR 133.102 |
| Dissolved Oxygen | Shall not be less than 6 mg/L | | | | | | 35 IAC 302.206 |
| pH | Shall be in the range of 6 to 9 Standard Units | | | | | | 35 IAC 304.125 |
| Fecal Coliform | Daily Maximum shall not exceed 400 per 100 mL | | | | | | 35 IAC 304.121 |
| Chlorine Residual | | | | | | 0.05 | 35 IAC 302.208 |
| Ammonia Nitrogen:<br>Feb.<br>March<br>April-May/Sept.-Oct.<br>June-August<br>Nov.-Jan. | <br>3.2 (7.9)<br>1.6 (4.0)<br>1.2 (3.0)<br>0.87 (2.2)<br>3.2 (7.9) | <br>--<br>--<br>--<br>2.2 (5.6)<br>-- | <br>5.6 (14)<br>2.4 (6.0)<br>2.4 (6.0)<br>2.4 (6.0)<br>6.3 (16) | <br>4.0<br>2.0<br>1.5<br>1.1<br>4.0 | <br>--<br>--<br>--<br>2.8<br>-- | <br>7.1<br>3.0<br>3.0<br>3.0<br>8.0 | <br>35 IAC 355 and<br>35 IAC 302 |
| Phosphorus | 0.8 (2.0) | | 1.6 (4.0) | 1.0 | | 2.0 | 35 IAC 304.123 |

*Load Limits are calculated by using the formula: 8.34 x (Design Average and/or Maximum Flow in MGD) x (Applicable Concentration in mg/L).

This draft Permit also contains the following requirements as special conditions:

1. Reopening of this Permit to include different final effluent limitations.

2. Operation of the facility by or under the supervision of a certified operator.

3. Submission of the operational data in a specified form and at a required frequency at any time during the effective term of this Permit.

4. More frequent monitoring requirement without Public Notice in the event of operational, maintenance or other problems resulting in possible effluent deterioration.

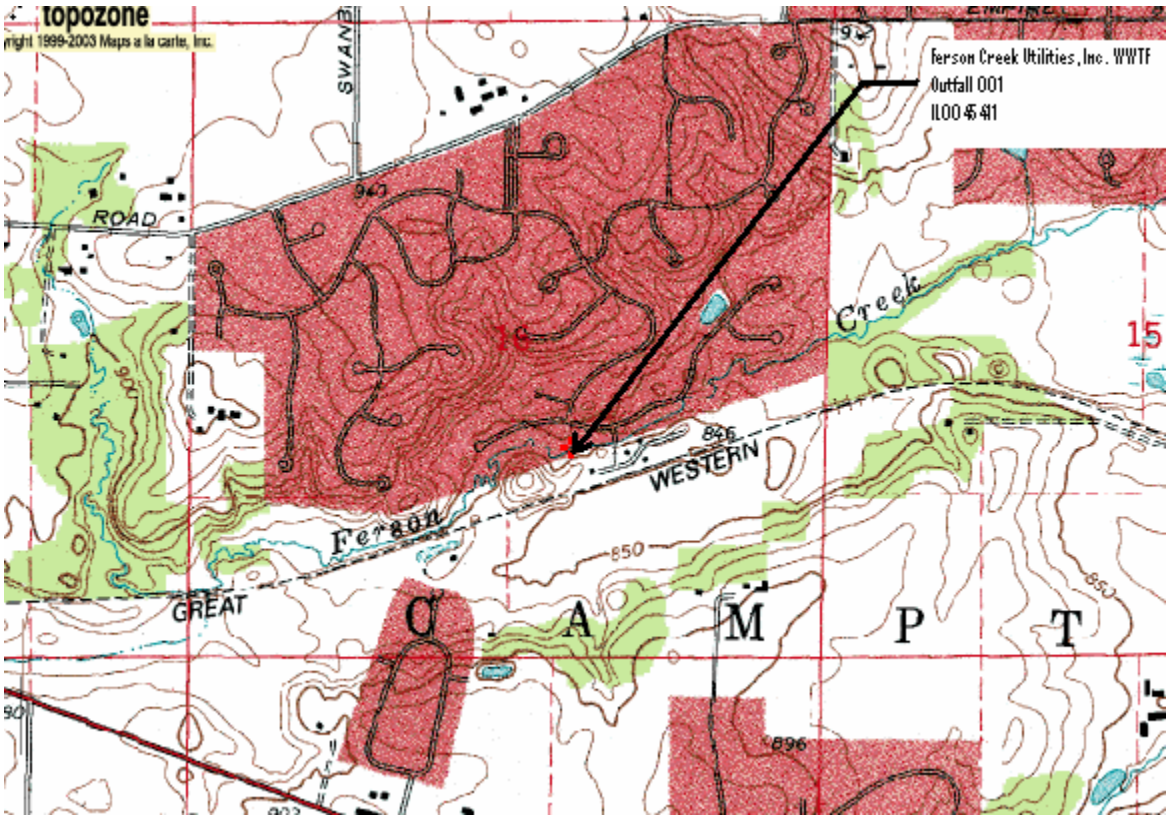
5. Prohibition against causing or contributing to violations of water quality standards.

6. Effluent sampling point location.

7. Submission of semi annual reports indicating the quantities of sludge generated and disposed.

8. Recording the monitoring results on Discharge Monitoring Report Forms using one such form for each outfall each month and submitting the forms to IEPA each month.

9. Compliance Schedule for meeting Dissolved Oxygen limitations.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Ferson Creek Utilities, Inc. WWTF
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NPDES Permit No. IL0045411

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Reissued (NPDES) Permit

Expiration Date:

Issue Date:
Effective Date:

Name and Address of Permittee:

Ferson Creek Utilities, Inc.
2335 Sanders Road
Northbrook, Illinois 60062

Facility Name and Address:

Ferson Creek WWTF
42 W. 371 Hidden Springs Drive
St. Charles, Illinois
(Kane County)

Receiving Waters: Ferson Creek

In compliance with the provisions of the Illinois Environmental Protection Act, Title 35 of the Ill. Adm. Code, Subtitle C, Chapter I, and the Clean Water Act (CWA), the above-named Permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the standard conditions and attachments herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the Permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

SAK:DGN:07030601.daa

NPDES Permit No. IL0045411

Effluent Limitations, Monitoring, and Reporting

FINAL

Discharge Number(s) and Name(s): 001 STP Outfall

Load limits computed based on a design average flow (DAF) of 0.095 MGD (design maximum flow (DMF) of 0.238 MGD).

Excess flow facilities (if applicable) shall not be utilized until the main treatment facility is receiving its maximum practical flow.

From the effective date of this Permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

| | LOAD LIMITS lbs/day DAF (DMF)* | | | CONCENTRATION LIMITS MG/L | | | | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Monthly Average | Weekly Average | Daily Maximum | Monthly Average | Weekly Average | Daily Maximum | Sample Frequency | Sample Type |
| Flow (MGD) | | | | | | | Continuous | |
| $CBOD_5$** | 7.9 (20) | | 16 (40) | 10 | | 20 | 1 Day/Month | Composite |
| Suspended Solids | 9.5 (24) | | 19 (48) | 12 | | 24 | 1 Day/Month | Composite |
| Dissolved Oxygen*** | Shall not be less than 6 mg/L | | | | | | 1 Day/Month | Grab |
| pH | Shall be in the range of 6 to 9 Standard Units | | | | | | 1 Day/Month | Grab |
| Fecal Coliform | Daily Maximum shall not exceed 400 per 100 mL | | | | | | 1 Day/Month | Grab |
| Chlorine Residual | | | | | | 0.05 | 1 Day/Month | Grab |
| Ammonia Nitrogen as (N) | | | | | | | | |
| Feb | 3.2 (7.9) | -- | 5.6 (14) | 4.0 | -- | 7.1 | 1 Day/Month | Composite |
| March | 1.6 (4.0) | -- | 2.4 (6.0) | 2.0 | -- | 3.0 | 1 Day/Month | Composite |
| April-May/Sept.-Oct. | 1.2 (3.0) | -- | 2.4 (6.0) | 1.5 | -- | 3.0 | 1 Day/Month | Composite |
| June-August | 0.87 (2.2) | 2.2 (5.6) | 2.4 (6.0) | 1.1 | 2.8 | 3.0 | 1 Day/Month | Composite |
| Nov.-Jan. | 3.2 (7.9) | -- | 6.3 (16) | 4.0 | -- | 8.0 | 1 Day/Month | Composite |
| Phosphorus | 0.8 (2.0) | | | 1.0 | | 2.0 | 1 Day/Month | Composite |

*Load limits based on design maximum flow shall apply only when flow exceeds design average flow.
**Carbonaceous $BOD_5$ ($CBOD_5$) testing shall be in accordance with 40 CFR 136.
***See Special Condition 9.

Flow shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

Fecal Coliform shall be reported on the DMR as daily maximum.

pH shall be reported on the DMR as a minimum and a maximum.

Chlorine Residual shall be reported on DMR as daily maximum.

Dissolved oxygen shall be reported on DMR as minimum.

NPDES Permit No. IL0045411

Influent Monitoring, and Reporting

The influent to the plant shall be monitored as follows:

| Parameter | Sample Frequency | Sample Type |
|---|---|---|
| Flow (MGD) | Continuous | |
| $BOD_5$ | 1 Day/Month | Composite |
| Suspended Solids | 1 Day/Month | Composite |

Influent samples shall be taken at a point representative of the influent.

Flow (MGD) shall be reported on the Discharge Monitoring Report (DMR) as monthly average and daily maximum.

$BOD_5$ and Suspended Solids shall be reported on the DMR as a monthly average concentration.

NPDES Permit No. IL0045411

Special Conditions

SPECIAL CONDITION 1. This Permit may be modified to include different final effluent limitations or requirements which are consistent with applicable laws, regulations, or judicial orders. The IEPA will public notice the permit modification.

SPECIAL CONDITION 2. The use or operation of this facility shall be by or under the supervision of a Certified Class 2 operator.

SPECIAL CONDITION 3. The IEPA may request in writing submittal of operational information in a specified form and at a required frequency at any time during the effective period of this Permit.

SPECIAL CONDITION 4. The IEPA may request more frequent monitoring by permit modification pursuant to 40 CFR ∋ 122.63 and Without Public Notice in the event of operational, maintenance or other problems resulting in possible effluent deterioration.

SPECIAL CONDITION 5. The effluent, alone or in combination with other sources, shall not cause a violation of any applicable water quality standard outlined in 35 Ill. Adm. Code 302.

SPECIAL CONDITION 6. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 7. For the duration of this Permit, the Permittee shall determine the quantity of sludge produced by the treatment facility in dry tons or gallons with average percent total solids analysis. The Permittee shall maintain adequate records of the quantities of sludge produced and have said records available for IEPA inspection. The Permittee shall submit to the IEPA, at a minimum, a semi-annual summary report of the quantities of sludge generated and disposed of, in units of dry tons or gallons (average total percent solids) by different disposal methods including but not limited to application on farmland, application on reclamation land, landfilling, public distribution, dedicated land disposal, sod farms, storage lagoons or any other specified disposal method. Said reports shall be submitted to the IEPA by January 31 and July 31 of each year reporting the preceding January thru June and July thru December interval of sludge disposal operations.

Duty to Mitigate. The Permittee shall take all reasonable steps to minimize any sludge use or disposal in violation of this Permit.

Sludge monitoring must be conducted according to test procedures approved under 40 CFR 136 unless otherwise specified in 40 CFR 503, unless other test procedures have been specified in this Permit.

Planned Changes. The Permittee shall give notice to the IEPA on the semi-annual report of any changes in sludge use and disposal.

The Permittee shall retain records of all sludge monitoring, and reports required by the Sludge Permit as referenced in Standard Condition 23 for a period of at least five (5) years from the date of this Permit.

If the Permittee monitors any pollutant more frequently than required by the Sludge Permit, the results of this monitoring shall be included in the reporting of data submitted to the IEPA.

Monitoring reports for sludge shall be reported on the form titled "Sludge Management Reports" to the following address:

Illinois Environmental Protection Agency
Bureau of Water
Compliance Assurance Section
Mail Code #19
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

SPECIAL CONDITION 8. The Permittee shall record monitoring results on Discharge Monitoring Report (DMR) Forms using one such form for each outfall each month.

In the event that an outfall does not discharge during a monthly reporting period, the DMR Form shall be submitted with no discharge indicated.

The Permittee may choose to submit electronic DMRs (eDMRs) instead of mailing paper DMRs to the IEPA. More information, including registration information for the eDMR program, can be obtained on the IEPA website, http://www.epa.state.il.us/water/edmr/index.html.

NPDES Permit No. IL0045411

Special Conditions

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 15th day of the following month, unless otherwise specified by the permitting authority.

Permittees not using eDMRs shall mail Discharge Monitoring Reports with an original signature to the IEPA at the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

Attention: Compliance Assurance Section, Mail Code # 19

SPECIAL CONDITION 9. A dissolved oxygen limit of 6 mg/L (Minimum) for Discharge Number 001 shall become effective one (1) year from the effective date of this Permit.

The Permittee shall obtain compliance with the dissolved oxygen effluent limit in accordance with the following schedule:

1. Progress Report ..... 6 months from Permit effective date

2. Obtain operational level ..... 12 months from Permit effective date

Compliance dates set out in this Permit may be superseded or supplemented by compliance dates in judicial orders, Illinois Pollution Control Board orders. This Permit may be modified, with Public Notice, to include such revised compliance dates.

The limitation of dissolved oxygen may be modified to refect any change in the Dissolved Oxygen Standard adapted by the Illinois Pollution Control Board under Docket #R04-25.

Reporting shall be submitted on the DMR's on a monthly basis.

REPORTING

The Permittee shall submit a report no later than fourteen (14) days following the completion dates indicated for each numbered item in the compliance schedule, indicating, a) the date the item was completed, or b) that the item was not completed, the reasons for non-completion and the anticipated completion date.

IEPA Log No.: **C-0929-05**
CoE appl. #: **200600172**

Public Notice Beginning Date: **August 25, 2006**
Public Notice Ending Date: **September 25, 2006**

Section 401 of the Federal Water Pollution Control Act
Amendments of 1972

**Section 401 Water Quality Certification to Discharge into Waters of the State**

**Public Notice/Fact Sheet Issued By:**

Illinois Environmental Protection Agency
Bureau of Water
Watershed Management Section
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276
217/782-3362

**Name and Address of Discharger:** Pine Ridge Park, LLC, 975 North 2nd Ave., St. Charles, IL 60174

**Discharge Location:** Section 29, T40N, R8E of the 3rd P.M. in Kane County within St. Charles

**Name of Receiving Water:** Unnamed Wetlands Tributary to Ferson Creek

**Project Description:** Construction of Pine Ridge Park Phase II. Construction will impact 0.93-acre of wetlands. Mitigation for these impacts will be through the purchase of 1.86 acre of wetland credit from the Ferson Creek Wetland Mitigation Bank.

The Illinois Environmental Protection Agency (IEPA) has received an application for a Section 401 water quality certification to discharge into the waters of the state associated with a Section 404 permit application received by the U.S. Army Corps of Engineers. The Public Notice period will begin and end on the dates indicated in the heading of this Public Notice. The last day comments will be received will be on the Public Notice period ending date unless a commenter demonstrating the need for additional time requests an extension to this comment period and the request is granted by the IEPA. Interested persons are invited to submit written comments on the project to the IEPA at the above address. Commenters shall provide their names and addresses along with comments on the certification application. Commenters may include a request for public hearing. The certification and notice number(s) must appear on each comment page.

The attached Fact Sheet provides a description of the project and the antidegradation assessment.

The application, Public Notice/Fact Sheet, comments received, and other documents are available for inspection and may be copied at the IEPA at the address shown above between 9:30 a.m. and 3:30 p.m. Monday through Friday when scheduled by the interested person.

If written comments or requests indicate a significant degree of public interest in the certification application, the IEPA may, at its discretion, hold a public hearing. Public notice will be given 30 days before any public hearing. If a Section 401 water quality certification is issued, response to relevant comments will be provided at the time of the certification. For further information, please call Thaddeus Faught at 217/782-3362.

TJF:0929-05PN.doc

**Fact Sheet for Antidegradation Assessment**
**Pine Ridge Park LLC – Unnamed Wetlands tributary to Ferson Creek – Kane County**
**IEPA Log No. C-0929-05**
**COE Log No. 200600172**
**Contact: Alyson Grady; 217/558-2012**
**August 25, 2006**

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The applicant has applied for 401 water quality certification for the proposed impact of 0.93-acre of jurisdictional wetlands located in St. Charles in Section 29, Township 40 North, Range 8 East, Kane County, Illinois. The proposed project site is located northwest of the Randall Road and North Avenue intersection. The proposed project will construct two commercial buildings on a 6-acre site as the Phase II portion of the Pine Ridge Park and Regency Estates development. Phase I of the development has already been permitted and contains wetland restoration activities to be constructed as resolution of a violation of the Clean Water Act on this property by the previous property owner. Phase II of the development will impact 0.93-acre of two wetland drainageways for the construction of the commercial development. The drainageways originate at an outlet for a large pipe and convey the stormwater from the adjoining properties to the existing wetlands located in the Phase I project site and downstream to Ferson Creek. The downstream wetlands are mapped as ADID wetland #2152 according to the Kane County ADID study. The wetlands are listed as high functional value wetlands. The proposed project will capture the existing storm flows from the drainageways and convey them through storm sewers and discharge downstream of the project site below the steep hill on the site. This will reduce the erosive flows in the drainageways and eliminate a significant sediment source to the downstream ADID wetland areas. All on-site stormwater will be conveyed to wetland bottom detention basins constructed as part of the Phase I development. Mitigation for the proposed impacts will be through the purchase of certified wetland mitigation bank credits from the Ferson Creek Wetland Mitigation Bank at a 2:1 ratio, resulting in the purchase of 1.86 acres of mitigation credit.

**Identification and Characterization of the Affected Water Body.**

The wetland drainageways have zero 7Q10 flow and are General Use waters. The wetland drainageways are not found on the 2006 Illinois 303(d) List nor are they rated under the Agency's Biological Steam Characterization (BSC) system. The drainageways are not listed as a biologically significant water body in the Illinois Natural History Survey publication Biologically Significant Illinois Streams. These wetland drainageways are tributary to Ferson Creek, Waterbody Segment DTF-02. The wetland drainageways originate from a stormwater outlet that conveys flow from the adjoining properties. The wetland drainageway splits into two channels within the project site. During periods of high flows, both channels will convey water. The channels average five feet in width and are incised. There is a steep elevation gradient within the project site. The banks of the drainageways are primarily vegetated by eastern cottonwood, box elder, reed canary grass, and common buckthorn. The wetland fringe associated with the drainageways is primarily vegetated by reed canary grass and common cattail. The Floristic Quality Index for the wetland drainageways is 9.5 with a Native Mean C value of 1.8.

**Identification of Proposed Pollutant Load Increases or Potential Impacts on Uses.**

The pollutant load increases that would occur from this project include some possible increases in suspended solids during the construction. The increase in suspended solids will be local and temporary. The proposed filling of 0.93-acre of wetland drainageway will eliminate the current habitat in the impacted area. On-site stormwater flows will be treated through a wetland bottom stormwater detention basin as a Best Management Practice. The off-site stormwater flows will be conveyed in a manner to reduce the sediment loading to the downstream wetland areas.

**Fate and Effect of Parameters Proposed for Increased Loading.**

The increase in suspended solids will be local and temporary. Erosion control measures will be utilized to minimize any increase in suspended solids and prevent further impact to the remaining wetlands. Mitigation for the wetland impacts will be through the purchase of wetland mitigation credits at a 2:1 ratio from the Ferson Creek Wetland Mitigation Bank.

**Purpose and Anticipated Benefits of the Proposed Activity.**

This project will construct a new commercial development providing more economic and employment opportunities for the community. This phase of the development is being constructed in support of the activities for the first phase of the development including the wetland restoration activities.

**Assessments of Alternatives for Less Increase in Loading or Minimal Environmental Degradation.**

The construction of the proposed project will follow guidelines set forth by the Agency and USACE. Erosion control measures need to be implemented to prevent additional impacts to the remaining and restored wetlands. The applicant did not consider off-site alternatives for this project as the applicant has agreed to fund the restoration of the impacted wetlands as part of the resolution of the enforcement action on the previous owner in return for the ability to develop the site. The proposed project has undergone some design changes over time. The City of St. Charles required that the development have an east-west road through the site which could connect to Randall Road. This roadway was placed as far south as possible in order to allow the restoration of the previously impacted wetland to occur. The least intrusive alternative would be to not impact the wetland drainageways. Avoidance of these drainageways would reduce the total buildable areas because of the significant topography on the properties and the associated embankments that would be necessary to avoid the areas. Reducing the buildable area affects the economics of the project. As the significant restoration costs, including the removal of up to 20 feet of fill material, are being funded through the development of the project site, a reduction in the size of the development jeopardizes the restoration activities. This is not an acceptable alternative given that this is a useful project and will provide the community with additional economic and employment opportunities as well as the restoration of higher quality wetlands.

**Summary Comments of the Illinois Department of Natural Resources, Regional Planning Commissions, Zoning Boards or Other Entities**

In a letter from John Rogner dated January 23, 2006, The U.S. Fish and Wildlife Service (USFWS) reviewed the project and indicated that the drainageways on-site are of low quality, have steep eroding slopes, and are sources of sedimentation for the downstream high quality aquatic resources (the high functional value ADID wetland). The USFWS commends the applicant for the restoration involved with the previous violation and the applicant's attempt to alleviate the sedimentation caused by the drainageways. The USFWS offers the following recommendations to provide further protection to the downstream ADID wetlands and Ferson Creek:

- Wetland impacts should be mitigated at a 3:1 ratio since they were designated as part of a high functional value wetland under the ADID study.
- Vegetated depressed islands with bioswales should be incorporated into the proposed parking areas and should be directed into the detention basins constructed as part of Phase I.
- Roof runoff from the proposed buildings should be directed into the detention basins. Galvanized roof coatings should not be used on the proposed roofs due to the toxicity to aquatic life.
- The applicant should maintain and monitor the BMPs for a period of five years and should provide financial assurances to ensure that the BMPs are properly maintained in perpetuity.

In a letter from Robert Schanzle dated January 23, 2006, IDNR indicated that no endangered/threatened species or Natural Areas are present in the vicinity of the project. IDNR has no objections to the issuance of a permit for the project. However, IDNR supports the specific recommendations of the USFWS as detailed above.

In a letter from Jedd Anderson dated February 7, 2006, Christopher B. Burke Engineering, Ltd. (CBBEL), on behalf of the applicant, responded to the recommendations made above. CBBEL concurs that the drainageways were mapped as part of the ADID wetland. However, field visits indicated that the drainageways are not naturally occurring. The ADID study likely did not complete a site specific evaluation of this site. CBBEL believes that if a site specific evaluation had been completed, the ADID limit would have been drawn at the toe of the hill. The applicant will be mitigating the water quality impacts onsite through the Best Management Practices (the wetland bottom detention basins) and will mitigate the habitat loss through the purchase of certified wetland bank credits. As certified credits are being purchased, the applicant will purchase them at a 1:1 ratio as allowed by the ICA. With regards to the construction of vegetated swales and depressed islands in the parking lots of this phase, CBBEL indicated that this phase of the project will not have parking lot configurations which are conducive for incorporation of bioswales. The stormwater runoff will be treated through the detention basins. In addition, all rooftop runoff will pass through the detention basins prior to discharge from the site. No galvanized roofing materials will be used. All BMPs have already been constructed as part of the Phase I project are will be functioning during the Phase II construction. Finally, with regards to the five years of management for the BMPs, this was required as part of the Phase I activities. The monitoring has already commenced.

As a final settlement with regards to the mitigation ratio for the impacts, the applicant is required to mitigate at a 3:1 ratio. However, since certified bank credits are being purchased, the ratio was reduced to 2:1.

**Agency Conclusion.**

This assessment was conducted pursuant to the Illinois Pollution Control Board regulation for Antidegradation found at 35 Ill. Adm. Code 302.105 (Antidegradation standard). We find that the proposed activity will result in the attainment of water quality standards. All technically and economically reasonable measures to avoid or minimize the extent of the proposed increase in pollutant loading have been incorporated into the proposed activity. This activity will benefit the community at large by providing more economic and employment opportunities. The proposed activity is therefore compliant with the Antidegradation standard.

US Army Corps of Engineers
Chicago District

Region 5

# KANE COUNTY ADVANCED IDENTIFICATION OF WETLANDS STUDY

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## FINALIZATION OF KANE COUNTY ADVANCED IDENTIFICATION STUDY

The U.S. Environmental Protection Agency, (USEPA) Region V, and the Chicago District of the U.S. Army Corps of Engineers (District), in consultation with Federal, state, and local regulatory and planning agencies, have completed an Advanced Identification (ADID) of aquatic resources study for Kane County, Illinois. This ADID was initiated as a planning tool to identify significant aquatic resources within the rapidly developing area of Kane County and to encourage their protection. The Kane County ADID identifies wetlands and streams that are generally unsuitable for the discharge of dredged and fill material or require special precautions. In addition, the information developed through the Kane County ADID process will provide watershed-based information that will be useful in planning for development, for evaluating the effects of development on water quality and flooding potential in a watershed, and in selecting sites for restoration or preservation.

The Kane County ADID has identified 139 wetlands as high quality habitant sites; An additional 372 wetlands were identified as having high value for stormwater and water quality functions. Approximately 70.5 stream miles in Kane County were designated high quality. It is ***NOT*** presumed that this study has identified every site of high value in Kane County. Maps illustrating the locations of the Kane County ADID sites and the final report may be reviewed at the Chicago District Regulatory Branch website, www.lrc.usace.army.mil/co-r or in paper form at:

U.S. Army Corps of Engineers, Chicago District
111 N. Canal St., Suite 600
Chicago, Illinois 60606
Kathy Chernich 312/846-5531

U.S. Environmental Protection Agency
Region V
77 W. Jackson Blvd 16th floor
Chicago, Illinois 60604
Sue Elston 312/886-6115

U.S. Fish and Wildlife Service Office
1250 S. Grove Ave. Suite 103
Barrington, Illinois 60010
Jeff Mengler 847/381-2253

Kane County
Department of Environmental Management
Kane County Gov center
Geneva, Illinois
Ken Anderson 630/208-3179

The Corps of Engineers regulates the discharge of dredged or fill material into wetlands and other waters of the United States pursuant to Section 404 of the Clean Water Act, and uses the Section 404(b)(1) Guidelines, found at 40 CFR Part 230 of the Federal Register to determine whether a permit for such activities should be issued. The Kane County ADID has identified high quality aquatic resources that would likely be found to be unsuitable for filling activities. The determination of unsuitability was based on the likelihood that the use of high quality habitat or high functional value sites for discharge of dredged or fill material would not comply with the Section 404(b)(1) Guidelines. Therefore, potential applicants are being notified in advance that it will be difficult to meet the requirements of the Section 404(b)(1) guidelines, which is necessary in order to receive a 404 permit to fill these sites. This ADID does not alter the existing permit application process but simplifies it by giving the public an advance indication of the probability of receiving a permit. The District will likely elevate permit applications for these sites to the individual permit review process and conduct a project specific environmental assessment and evaluate the project for compliance with the 404(b)(1) Guidelines.

ADID sites were identified as being high habitat value, high functional value, and/or high quality streams were determined to be unsuitable for fill activities. This determination was made by evaluating the aquatic resources of Kane County with respect to two functional areas: quality of biological community/habitat value and water quality/stormwater storage functions. For the high habitat value wetland sites, habitat quality and/or floristic diversity were assessed. The assessment of stream habitat quality was based on Index of Biological Integrity scores, which were recently revised by the Illinois Department of Natural Resources. Streams with a score of 50 or more are considered Grade A and were identified as high quality in the Kane County ADID.

Sites identified as providing high functional value for water quality improvement and stormwater storage functions were evaluated to assess their value for one or more of the following functions: shoreline and streambank stabilization, sediment and toxicant retention, nutrient removal and transformation and stormwater storage/hydrologic stabilization. Any wetland meeting three of the four criteria for water quality/stormwater storage functions was identified as a high functional value wetland. A wetland was also considered to have high functional value if it met one or more of the water quality criteria and was located in a critical position within the watershed with respect to high habitat quality wetlands or streams.

Detailed descriptions of all of the methods uses to assess these functions are provided in the Advanced Identification Study Kane County, Illinois Final Report.

**Summary of ADID Results for Kane County**

-A total of 139 wetlands totaling 5,788 acres met the criteria for High Habitat Value. High Habitat value wetlands comprise approximately 1.7% of the 334,080 acres that make the entire area of Kane County, and approximately 21% of the county's 27,368 acres of wetland. Approximately one third of the high Habitat Value wetlands are currently within Kane County Forest Preserves or are within Illinois Natural Area Inventory sites.

-Including the Fox River, 70.5 of a total of 418 river and stream miles in Kane County or 17%, were designated high quality streams. High quality stream segments were found on several different streams and rivers scattered throughout the county including Big Rock Creek, East Branch Big Rock Creek, Ferson/Otter Creek, the Fox River, Mill Creek, Poplar Creek, Tyler Creek, Waubonsie Creek, Welch Creek, Burlington Creek, and Union Ditch #3. Both Burlington Creek and Union Ditch #3 were added as high quality streams based on IBI data collected by the Illinois Department of Natural Resources in July 2004.

-A total of 372 wetlands, comprising 10,745 acres or 3.2% of the entire area of Kane County, met the criteria for High Functional Value. The High Functional Value wetlands comprise approximately 39% of the county's 27,368 acres of wetland.

On May 14, 2004, the USEPA and the District issued a joint public notice announcing the preliminary findings for the Kane County, Illinois ADID study. The public notice solicited comments on the proposed Kane County ADID findings. An informational public meeting was held on June 16, 2004 at the Kane County Governmental Center in Geneva, Illinois to provide the public an opportunity to ask questions and provide comments on the Kane County ADID. No comments were received from the public in response to the public notice on the ADID study.

A copy of the record of decision can be reviewed at either the USEPA's office or at the District office.

ORIGINAL SIGNED

16 Sep 2004
Date

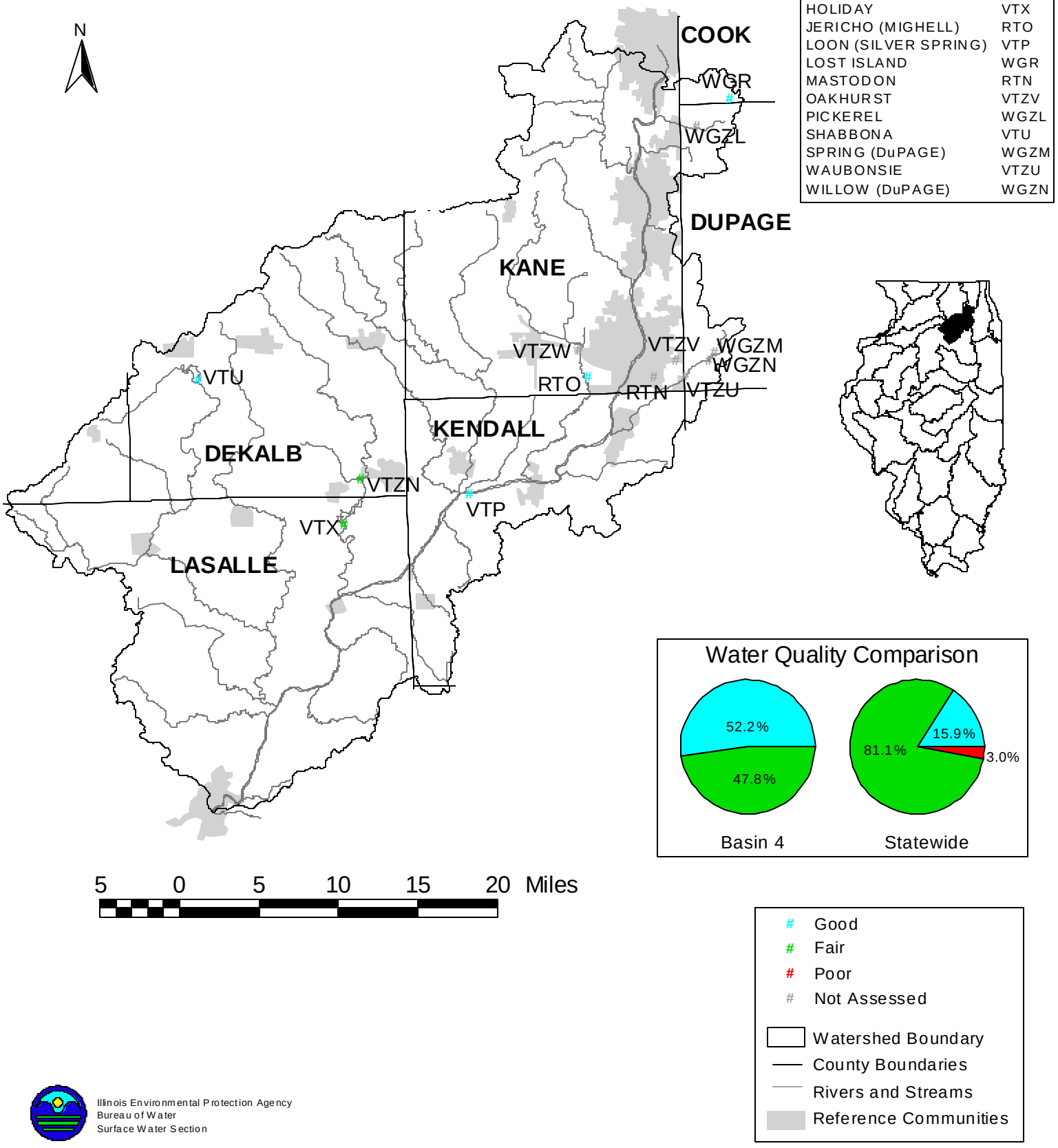
KEVIN PIERARD, Chief
Watersheds and Wetlands Branch
U.S. Environmental Protection Agency
Region V

20 Sep 2004
Date

ORIGINAL SIGNED

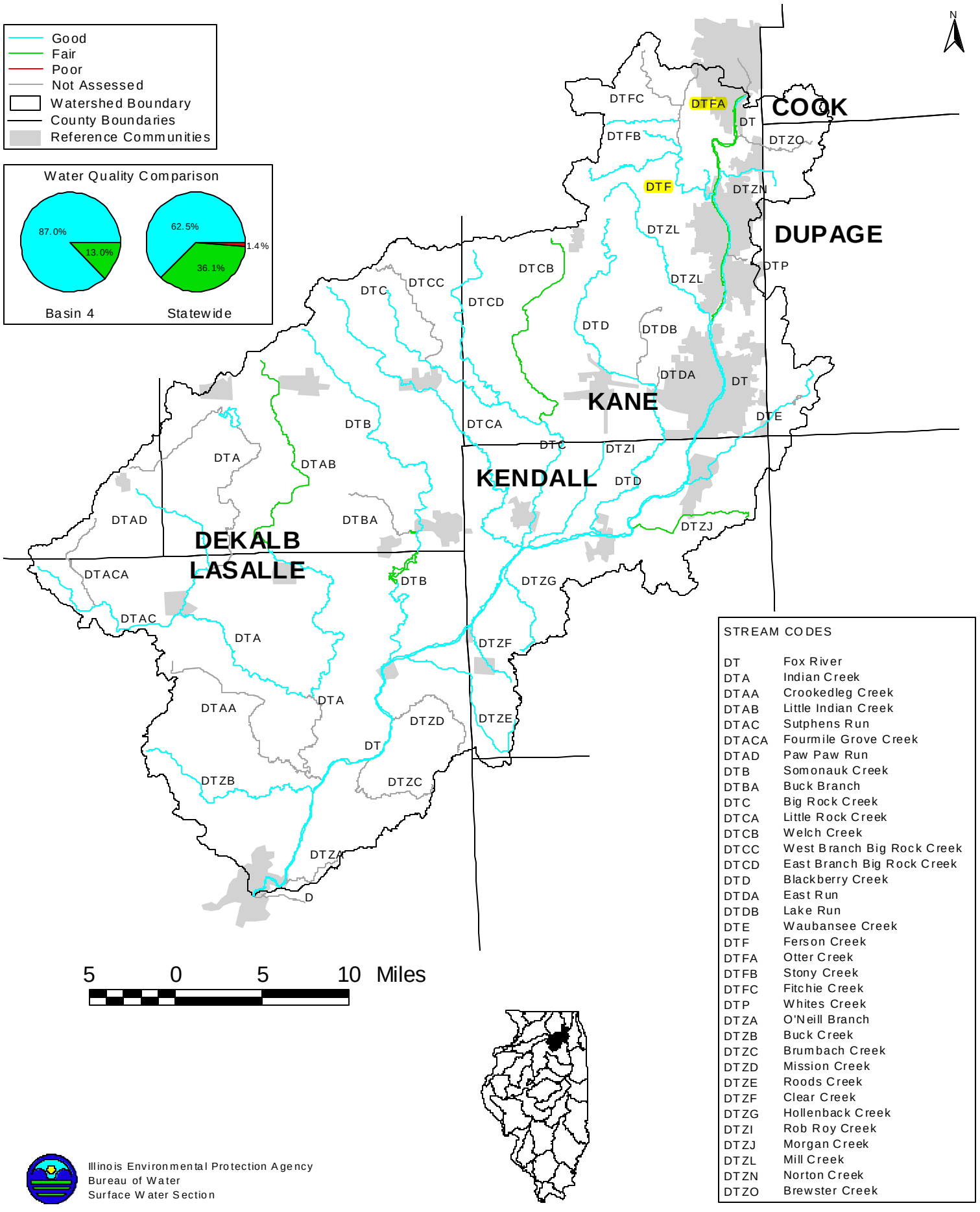
MITCH ISOE, Chief
Regulatory Branch
Chicago District
U. S. Army Corps of Engineers

# 4. Lower Fox River Watershed




Illinois Environmental Protection Agency
Bureau of Water
Surface Water Section

# 4. Lower Fox River Watershed




STREAM CODES

| | |
|---|---|
| DT | Fox River |
| DTA | Indian Creek |
| DTAA | Crookedleg Creek |
| DTAB | Little Indian Creek |
| DTAC | Sutphens Run |
| DTACA | Fourmile Grove Creek |
| DTAD | Paw Paw Run |
| DTB | Somonauk Creek |
| DTBA | Buck Branch |
| DTC | Big Rock Creek |
| DTCA | Little Rock Creek |
| DTCB | Welch Creek |
| DTCC | West Branch Big Rock Creek |
| DTCD | East Branch Big Rock Creek |
| DTD | Blackberry Creek |
| DTDA | East Run |
| DTDB | Lake Run |
| DTE | Waubansee Creek |
| DTF | Ferson Creek |
| DTFA | Otter Creek |
| DTFB | Stony Creek |
| DTFC | Fitchie Creek |
| DTP | Whites Creek |
| DTZA | O'Neill Branch |
| DTZB | Buck Creek |
| DTZC | Brumbach Creek |
| DTZD | Mission Creek |
| DTZE | Roods Creek |
| DTZF | Clear Creek |
| DTZG | Hollenback Creek |
| DTZI | Rob Roy Creek |
| DTZJ | Morgan Creek |
| DTZL | Mill Creek |
| DTZN | Norton Creek |
| DTZO | Brewster Creek |


Illinois Environmental Protection Agency
Bureau of Water
Surface Water Section

Lower Fox River Watershed

Pat Quinn, Governor



To report
environmental
emergencies
only, call the
Illinois Emergency
Management Agency
800-782-7860

217-782-7860
(24 hrs/day)

Watersheds of Illinois - 19964. Lower Fox River Watershed

The Lower Fox River Watershed covers a total of 701,195 acres in Kane, DuPage, DeKalb, Kendall, and LaSalle counties. The majority of the watershed is in agricultural lands with expanding urban areas. Some of the cities located in the watershed include Aurora (99,556), St. Charles (22,847), Batavia (17,076), and Geneva (14,563). Major streams which comprise the Lower Fox River Watershed include the Fox River, Ferson Creek, Mill Creek, Blackberry Creek, Big Rock Creek, Little Rock Creek, Somonauk Creek, Little Indian Creek, Indian Creek, and Buck Creek. A total of 548 stream miles were assessed on the Fox River and its tributaries. Overall resource quality is "good" on 495 stream miles (90%), and "fair" conditions exist on 53 stream miles (10%). The primary causes of water quality problems are nutrients and siltation attributed to agriculture and hydrologic/habitat modifications. A total of nine lakes covering 797 acres were also assessed in the watershed. Overall resource quality is "good" on 421 acres (53%), "fair" on 350 acres (44%), and "poor" on 26 acres (3%). The primary causes of water quality problems are siltation and suspended solids attributed to agriculture.

Fox River

The Fox River (DT) originates in southeastern Wisconsin just west of Milwaukee and flows southward before entering Illinois in the northwest corner of Lake County. The Fox then flows in a general southerly direction until it joins the Illinois River at Ottawa, Ill. A total of 83 stream miles were assessed on the river. Of the total, 74 stream miles were rated as having "good" overall resource quality, and the remaining nine stream miles were rated as "fair," mainly due to habitat alterations attributed

to hydrologic/habitat modifications.

Ferson Creek

Ferson Creek (DTF) was rated as having "fair" overall resource quality. This was based on an assessment of 20 stream miles. Nutrients and siltation from hydrologic/habitat modifications and agriculture were the major factors impacting Ferson Creek.

Lake Shabbona

Lake Shabbona (VTU), located in DeKalb County, is a state-owned lake managed by the Illinois Department of Natural Resources. The lake was created by damming Indian Creek in 1975. It has a surface area of 318 acres and a watershed of 12,890 acres. The overall resource quality of Lake Shabbona is considered "good." Causes of pollution to the lake include nutrients, siltation, organic enrichment (low dissolved oxygen), and noxious aquatic plants. The primary source of pollution is agriculture.

Loon (Silver Spring) Lake

Loon (Silver Spring) Lake (VTP), in Kendall County, is also a state-owned lake managed by the Illinois Department of Natural Resources. The lake was built in 1960 by excavating a lowland area. It has a surface area of 16 acres and receives its water from a small 20 acre watershed and through groundwater infiltration. The overall resource quality of Loon Lake is considered "good." No causes or sources of pollution have been identified as currently impacting Loon Lake.

Lake Holiday

Lake Holiday (VTX), located in LaSalle County, is an organizational lake managed by the Lake Holiday Property Owners Association. The lake was created in 1965 by damming Somonauk Creek. It has a surface area of 326 acres and receives water from its rather large 40,000 acre watershed. The overall resource quality of Lake Holiday is considered "fair." Causes of pollution to the lake include siltation and suspended solids. The primary source of pollution is agriculture.


Water Menu
Water Pollution Control
Public Water Supply
Financial Assistance
About the Bureau
Forms
Publications
Rules & Regulations
Partners for Conservation
Water Resource Assessments
Total Maximum Daily Load
Storm Water Requirements
Green Infrastructure Plan
Nutrient Issues

# ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
# NOTICE OF INTENT (NOI)
## GENERAL PERMIT TO DISCHARGE STORM WATER CONSTRUCTION SITE ACTIVITIES

### OWNER INFORMATION

| | | | | |
|---|---|---|---|---|
| COMPANY/ OWNER NAME: | Nicor Gas | | OWNER TYPE: SELECT ONE Private MS4 Community ☐Yes ☑No | |
| MAILING ADDRESS: | 1844 Ferry Road | | PHONE: Area Code ( 630 ) Number 388-2456 ext. | |
| CITY: | Naperville | STATE: IL / ZIP CODE: 60563 | FAX: Area Code ( 630 ) Number 983-4345 | |
| CONTACT PERSON: Claudia Macholz | | | EMAIL: cmachol@nicor.com | |

### CONTRACTOR INFORMATION

| | | | |
|---|---|---|---|
| CONTRACTOR NAME: | Nicor Gas | | |
| MAILING ADDRESS: | 1844 Ferry Road | PHONE: Area Code ( 630 ) Number 388-2456 ext. | |
| CITY: | Naperville | STATE: IL | ZIP CODE: 60563 |

### CONSTRUCTION SITE INFORMATION

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SELECT ONE: | ☑ NEW SITE ☐ CHANGE OF INFORMATION FOR: ILR10 | | | | | | | | | |
| PROJECT NAME: | SI136 - Burlington Road - Wasco - WO 126704 | | | | | | | COUNTY: Kane | | |
| STREET ADDRESS/ LOCATION | Burlington Rd (from IL Rt 64 to Empire Rd) | | | | | CITY: Wasco | | IL | ZIP CODE: | |
| LATITUDE: | DEG. | MIN. | SEC. | LONGITUDE: | DEG. | MIN. | SEC. | SECTION: 11,14, 23 | TOWNSHIP: 40N | RANGE: 7E |
| APPROX CONST START DATE 05 / 01 / 08 | APPROX CONST END DATE 10 / 01 / 08 | | | TOTAL SIZE OF CONSTRUCTION SITE IN ACRES: 3.4 If less than 1 acre, is site part of larger common plan of development? ☐ YES ☑ NO | | | | | | |

### STORM WATER POLLUTION PREVENTION PLAN INFORMATION

| | | | |
|---|---|---|---|
| HAS STORM WATER POLLUTION PREVENTION PLAN BEEN SUBMITTED TO AGENCY? ☑ YES ☐ NO (SUBMIT SWPPP ELECTRONICALLY TO: epa.constilr10swppp@illinois.gov ) | | | |
| WILL STORM WATER POLLUTION PREVENTION PLAN BE AVAILABLE AT SITE? ☑ YES ☐ NO | | | |
| LOCATION OF SWPPP FOR VIEWING: ADDRESS: On site | | | CITY: |
| SWPPP CONTACT INFORMATION: NAME: Nicor Representative | | | INSPECTOR QUALIFICATIONS: SELECT ONE Other |
| PHONE: ( ) | FAX: ( ) | EMAIL: | |
| PROJECT INSPECTOR, IF DIFFERENT THAN ABOVE: NAME: | | | INSPECTOR QUALIFICATIONS: SELECT ONE Other |
| PHONE: ( ) | FAX: ( ) | EMAIL: | |

# ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
# NOTICE OF INTENT (NOI)
## GENERAL PERMIT TO DISCHARGE STORM WATER CONSTRUCTION SITE ACTIVITIES

## TYPE OF CONSTRUCTION (SELECT ALL THAT APPLY)

**SELECT ONE** Other

SIC Code: 4924

**TYPE DETAILED DESCRIPTION OF PROJECT:**

Natural gas pipe will be installed along Burlington Road from IL Route 64 to Empire Road near Wasco, IL.

## HISTORIC PRESERVATION AND ENDANGERED SPECIES COMPLIANCE

**HAS THIS PROJECT BEEN SUBMITTED TO THE FOLLOWING STATE AGENCIES TO SATISFY APPLICABLE REQUIREMENTS FOR COMPLIANCE WITH ILLINOIS LAW ON:**

| | | | |
|---|---|---|---|
| HISTORIC PRESERVATION | ☑ YES | ☐ NO | http://www.illinoishistory.gov/PS/rcdocument.htm |
| ENDANGERED SPECIES | ☑ YES | ☐ NO | http://dnrecocat.state.il.us/ecopublic/ |

## RECEIVING WATER INFORMATION

**DOES YOUR STORM WATER DISCHARGE DIRECTLY TO:** ☑ WATERS OF THE STATE OR ☐ STORM SEWER

**OWNER TO STORM SEWER SYSTEMS:**

**NAME OF CLOSEST RECEIVING WATERBODY TO WHICH YOU DISCHARGE:** Ferson Creek

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I certify that the provisions of the permit, including the development and implementation of a storm water pollution prevention plan and a monitoring program plan, will be complied with.

**OWNER SIGNATURE:** _____ **DATE:** 1/9/09

**SUBMIT ELECTRONICALLY TO:**
epa.constilr10swppp@illinois.gov

**OR MAIL COMPLETED FROM TO:**

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
ATTN: PERMIT SECTION
POST OFFICE BOX 19276
SPRINGFIELD, ILLINOIS 62794-9276
www.epa.state.il.us

**FOR OFFICE USE ONLY**

| |
|---|
| LOG: |
| PERMIT NO. ILR10 ___ ___ ___ ___ |
| DATE: |

Information required by this form must be provided to comply with 415 ILCS 5/39 (1996). Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

IL 532 2104
WPC 623 Rev. 8/08

# Full Project Proposal

**PROJECT NAME:**

NFPP Phase I - Ferson-Otter Creek Dam Removal/Modification Project, Fox River Watershed, Illinois

**FIELD OFFICE:**

Carterville NFWCO

**PROJECT COORDINATOR:**

Nate Caswell

**FONS NUMBER:**

31340-2009-062

**FUNDING REQUESTED:**

On-the-ground funding request is for $10,000.00 from the National Fish Passage Program.

We will have a contribution of $10,000.00 from the Kane County Forest Preserve District, and in-kind contributions of $5,000 from the Kane County Department of Environmental & Building Management and $4,125 from the Illinois Department of Natural Resources for a project total of $29,125.00.

**STATEMENT OF PROBLEM:**

Ferson-Otter Creek is a tributary to the Fox River, located in the east central part of Kane County, Illinois. The watershed area is approximately 50 square miles including 45 linear miles of stream habitat. Data from Illinois Department of Natural Resources (IDNR) surveys indicate that the lower the segments of Ferson-Otter Creek have a diverse fish community with Index of Biotic Integrity scores in the 48-50 range (on a scale of 0-60), representing the highest quality tributary habitat available within the St. Charles Pool of the Fox River. Unfortunately, the upper segments of Ferson-Otter Creek have lower fish diversity and overall, show lower IBI scores. We have identified two impassable dams and a number of low water barriers within the watershed which appear to be limiting upstream fish communities. Other factors contributing to the degraded communities in the watershed include effects from urban and agricultural land use practices. The City of St. Charles has been very active in stream restoration within the Ferson-Otter watershed, re-creating a large streamside wetland to mitigate urban development, and restoring the adjoining stream channel in the upper watershed – a project which has served as a region-wide model for urbanizing watersheds. Kane County is also a very active partner in stream protection through use of ordinances and its renowned program to preserve farmland.

Existing migration barriers on Ferson-Otter Creek are limiting restoration efforts already underway on the upper segments of the stream and will continue to be an impediment to full restoration for fish communities. A total of 12 fish species were only found downstream of the two impassable dams on Ferson-Otter Creek, based on IDNR surveys. Although mussel data is not currently available, it is likely that they are also affected, as shown in other watersheds in Illinois and throughout the country. Furthermore, Ferson-Otter Creek is important to Fox River fish communities as one of the largest and highest quality tributaries within the St. Charles Pool, between the St. Charles and South Elgin Dams. Tributaries serve an important function as spawning, nursery, and foraging areas for riverine species, such as the smallmouth bass, channel catfish, and golden redhorse; all species which occur only in the lower segments of Ferson-Otter Creek. Smallmouth bass and channel catfish are well-known sport species, especially important for local urban anglers. Moreover, redhorse species have been shown to be rare and vulnerable to extirpation in this segment of the Fox River due to fragmentation by

mainstem Fox River Dams (Santucci et al., No. Amer. Journal of Fisheries Management 25(3):975-992).

## PROJECT OBJECTIVES:

This project represents Phase I of multi-phased program to create uninterrupted fish passage throughout 44 miles of stream habitat in the Ferson-Otter Creek watershed. Our primary objective for Phase I is to remove the impassable dam at Creek Bend Forest Preserve and to modify the Davoust Dam located downstream of Creek Bend, in order to open an additional 3.25 miles of lower Ferson-Otter Creek to the Fox River. Completion of Phase I will allow us to use these projects as models for low cost stream restoration, and to give examples to present to other private landowners in order to foster cooperation for the watershed wide approach. Phase one will also include evaluation of the fish community response.

## DESCRIPTION OF PROPOSED PROJECT:

### Location

These sites are located in the State of Illinois within Kane County and Congressional District 14. The Ferson/Otter Creek watershed is a tributary of the lower Fox River (8-digit HUC #07120007.
Coordinates:
Davoust Dam – 41.9340$^{o}$ N; -88.3388$^{o}$ W
Creek Bend Forest Preserve Dam – 41.9298$^{o}$ N; -88.3516$^{o}$ W

### Description of On-The-Ground Work

Working with our partners, we have identified six potential fish passage barriers in the first 3.9 miles of Ferson Creek. After evaluation, we determined that two of them represent substantial barriers to fish passage. We believe that the other four potential barriers identified in this section of Ferson Creek are already passable except under extremely low flows. Two of these barriers are low concrete and rock dams. One of these dams has the stream flow concentrated to one side, where we believe fish can pass. The stream itself has eroded a bypass channel around the other dam. No modifications are proposed at these sites. The last two barriers are man made rock riffles. Although they currently allow fish passage, they are poorly constructed, and may be hand modified to prevent erosion problems.

Much of the effort and expense for Phase I of this project will focus on removal of the impassable dam at Otter Bend Forest Preserve. This structure is approximately 3.5 feet in height, and is constructed of large boulders grouted in concrete. Step one of this part of the project will entail a thorough field survey at the site to obtain exact elevations of stream channel in the area of the dam. Step 2 will be to develop a detailed construction and post removal restoration plan. Based on preliminary survey and evaluation, the dam will be deconstructed using a track backhoe and the boulders from the dam will be used in conjunction with additional stone material to construct a riffle in place of the existing dam. We plan to match the invert of the newly constructed riffle to the upstream sediment elevation. There is very little fine sediment in the upstream area and only modest accumulation of bed load, which will be largely held in place by the newly constructed riffle structure. After completing the detailed plan, we will obtain Section 404 Permits from the U.S. Army Corps of Engineers (USACE) and the Illinois Department of Natural Resources (IDNR). Actual construction is anticipated to take 3.5 days.

Another feature of Phase I is to modify the Davoust Dam downstream of Creek Bend Forest Preserve. This structure is made of loose boulders without concrete grouting. This barrier is less than 18 inches in height and already has deteriorated from age and high flow events. No permits will be required for this work, and in fact all work will be done by hand since there is no access for equipment. Boulders within the structure will be rearranged to enhance fish passage and to direct flow to the center of the creek to prevent erosion of downstream banks. Work will be done at low flow, under supervision of IDNR Fisheries Personnel to insure adequate low-water fish passage. Manual labor will provided by largely Kane County, representing a significant portion of their in-kind match. This portion of the project should require approximately 1.5 days.

Finally, IDNR Fisheries personnel, together with Kane County assistance, will spend 4 days sampling fish at 4 locations, requiring 2 days pre-project and 2 days post project sampling.

## Probability of Completion

We anticipate 100% probability of completion within one year of receiving adequate funding.

## Partner Contribution and Total Project Costs

| Contributing Partners | Cash or In-Kind? | Amount $ Contributed |
|---|---|---|
| Kane County Forest Preserve District | Cash | $10,000.00 |
| Kane County Department of Environmental & Building Management | In-Kind | $5,000.00 |
| Illinois Department of Natural Resources | | $4,125.00 |
| | | |
| | | |
| Total FWS Fish Passage Contribution (include only on-the-ground costs) | Cash | $10,000.00 |
| **Total Project Cost =** | | $29,125.00 |

## Itemized List of What Service Funds Will Be Spent On

| Expense Item | $ |
|---|---|
| Backhoe Operation (30hrs @ $200/hour) | $6,000.00 |
| Manual Labor (45hrs @ $90.00/hour) | $4,000.00 |
| | |
| | |
| | |
| | |
| | |
| | |
| **Total FWS Fish Passage Contribution =** | $10,000.00 |

## HOW DOES THIS PROJECT ADDRESS FWS PRIORITIES?:

Northern Illinois has many miles of quality streams and rivers, but many lower-order streams are not publicly accessible beyond public right-of-ways. Improving habitat quality in tributary streams by removing barriers can improve the fishery throughout the river system, benefiting both the public and private landowners. Removal of barriers can also improve the fishery in the river it feeds by allowing access to spawning and rearing habitat. In this case, fish passage improvements on Ferson/Otter Creeks will serve to raise the long-term health of the fish community in the Fox River, which includes popular sport species such as smallmouth bass and channel catfish.

## HOW DOES THIS PROJECT ADDRESS PARTNER PRIORITIES?:

This dam removal and modification project will address one of our primary priorities related to the Fox River Watershed Management Plan in which our goal is the uninhibited connection of all tributaries to

the main stem of the Fox River. Dam removal is also a high priority for the Illinois Department of Natural Resources as indicated in their Strategic Plan, as well as the Illinois River Restoration Project (USACE, IDNR) which identified Northeastern Illinois as a high priority area for reconnection of stream habitat. Dam removal and fish passage has been a high priority for IDNR Region II Streams Program, who have been involved in three USFWS National Fish Passage Program Grants; so far, the only ones awarded in Illinois.

**ANITICIPATED BENEFITS:**

**Watershed-Level Ecological Benefits**

The City of St. Charles has been very active in stream restoration within the Ferson-Otter watershed, re-creating a large streamside wetland to mitigate urban development, and restoring the adjoining stream channel in the upper watershed – a project which has served as a region-wide model for urbanizing watersheds. Kane County is also a very active partner in stream protection through use of ordinances and its renowned program to preserve farmland. Existing migration barriers on Ferson-Otter Creek are limiting restoration efforts already underway on the upper segments of the stream and will continue to be an impediment to full restoration for fish communities. A total of 12 fish species were only found downstream of the two impassable dams on Ferson-Otter Creek, based on IDNR surveys. Although mussel data is not currently available, it is likely that they are also affected, as shown in other watersheds in Illinois and throughout the country. Removal of the Ferson Creek Dams will help restoration in these upstream areas by reconnecting them to recruitment sources so fish can take advantage these projects already in place, as well as future projects and all other adequate habitats upstream of the removed barriers

Furthermore, Ferson-Otter Creek is important to Fox River fish communities as one of the largest and highest quality tributaries within the St. Charles Pool, between the St. Charles and South Elgin Dams. Tributaries serve an important function as spawning, nursery, and foraging areas for riverine species, such as the smallmouth bass, channel catfish, and golden redhorse; all species which occur only in the lower segments of Ferson-Otter Creek. Smallmouth bass and channel catfish are well-known sport species, especially important for local urban anglers. Moreover, redhorse species have been shown to be rare and vulnerable to extirpation in this segment of the Fox River due to fragmentation by mainstem Fox River Dams (Santucci et al., No. Amer. Journal of Fisheries Management 25(3):975-992. Therefore, we anticipated removal of the Ferson Creek barriers will also benefit the Fox River mainstem.

**Primary Native Species to Benefit**

Smallmouth bass, a popular sport fish species is currently being impacted by the Ferson-Otter Creek dams. This species has been identified by IDNR as a species in greatest need of conservation in the State Wildlife Plan. The plan also identifies Channel catfish, the most sought after species in the Fox River. Other non-game species in Ferson Creek identified as critical by the statewide plan include, largescale stoneroller, rosyface shiner, blacknose dace, and mottled sculpin.

**Stream Miles or Wetland Acres Reconnected**

This project will open an additional 3.25 miles of streams in the Ferson/Otter Creek watershed to the Fox River (based on FPDSS mapping utility). Although this is not a large number of miles, much of the cost for this project will be spent on the largest barrier in this system (F5). We anticipate that future phases of this project will have a much higher ratio of miles opened per unit cost.

**Other Social Benefits**

The removal of the dam located on the Creek Bend Forest Preserve removes a potentially dangerous situation. In addition, it will provide an unrestricted stream system during high flows and an improved recreational environment for forest preserve users.

**Possible Negative Impacts**

There are no anticipated negative ecological impacts to this project.

## EXISTING BIOLOGICAL AND PHYSICAL MONITORING DATA:

IDNR has conducted several fish surveys downstream of the Creek Bend Forest Preserve Site. This information has been attached as Appendix D. Also, St. Charles North High School is proposing a class project to collect some base information for the Creek Bend Forest Preserve site which will include some benthic and water quality data.

## BRIEF SUMMARY OF WHY THIS PROJECT SHOULD BE FUNDED:

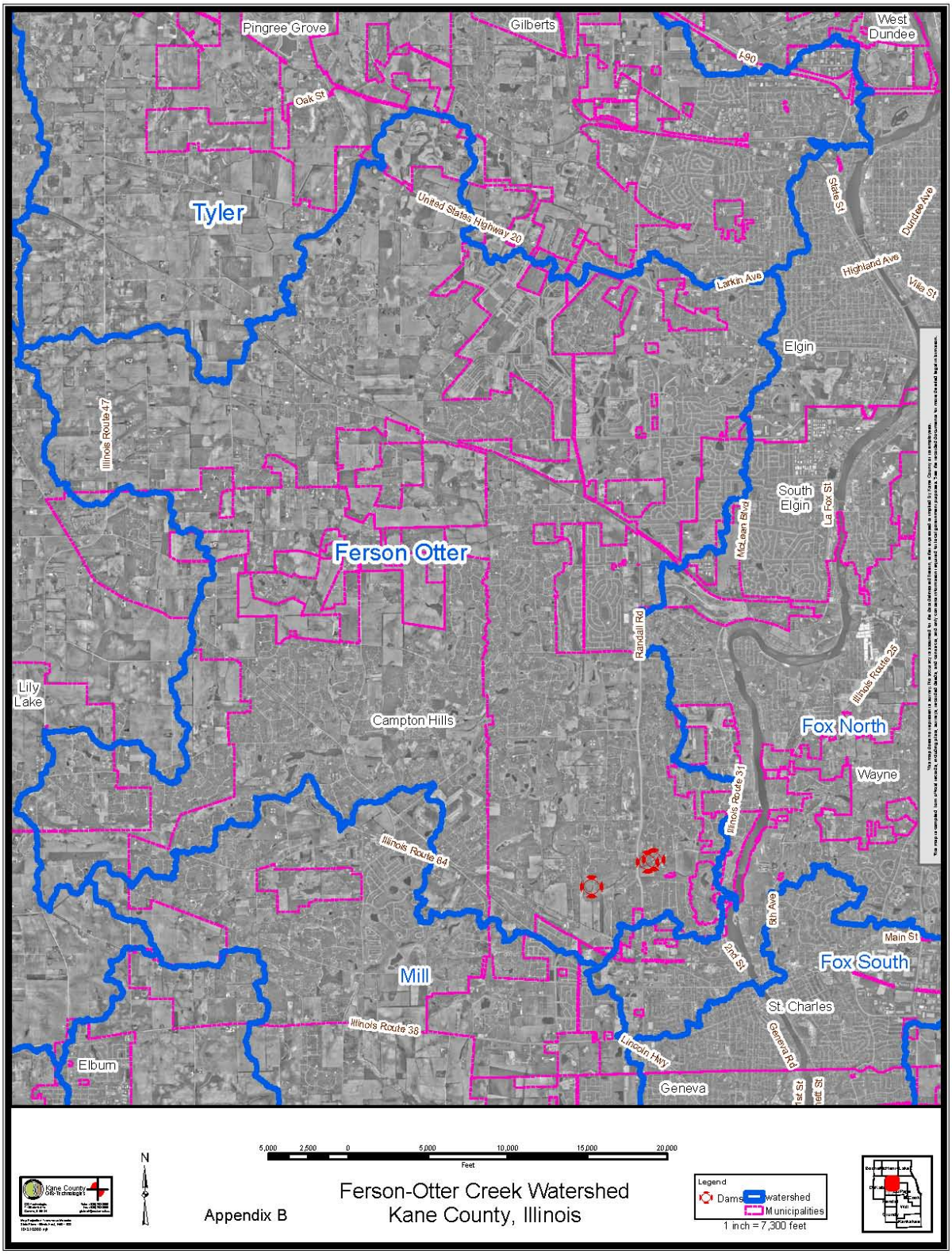
Ferson Creek is one of the Middle Fox River's highest quality tributaries. However, this area of Illinois has been subject to intense urban development, as well as agricultural activity. These streams are under intense pressure, and need to be protected and restored whenever possible. The barriers present in this watershed may affect long-term biodiversity, and currently impact movements and habitat availability for fish and mussels from the Fox River and within the Ferson/Otter Creek watershed. Fish passage improvements on Ferson/Otter Creeks will serve to raise the long-term health of the fish community in the Fox River, which includes popular sport species such as smallmouth bass and channel catfish. This dam removal and modification project will address one of the primary priorities of the Fox River Watershed Management Plan in which the goal is the uninhibited connection of all tributaries to the main stem of the Fox River.

**APPENDIX A- Pictures of the Project Site**

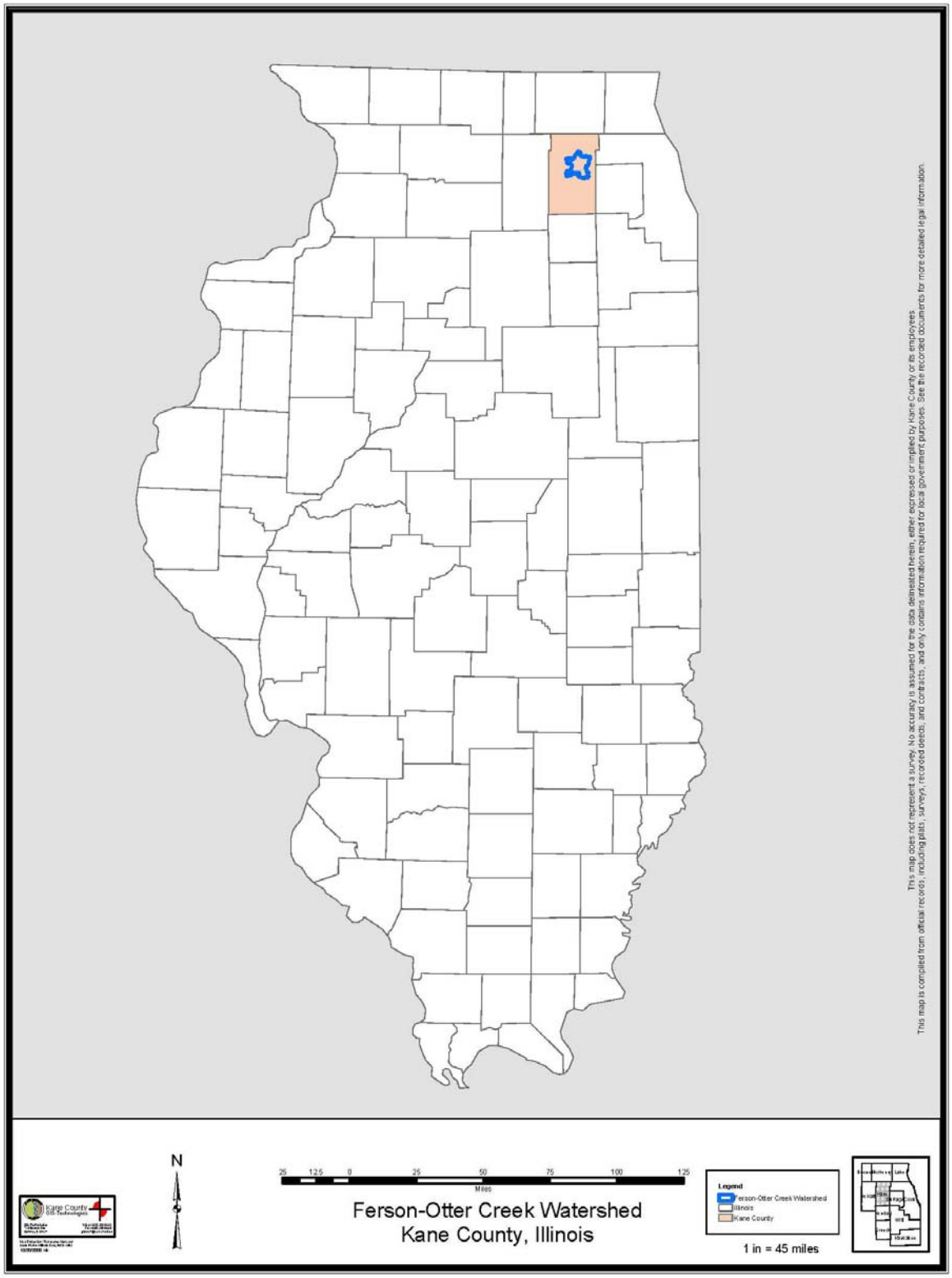
Figure 1. Photograph of the Davoust Dam (Barrier F3).

Figure 2. Photographs of the Creek Bend Forest Preserve Dam (Barrier F5) showing a view looking (clockwise from top left) across the dam, upstream at the dam, upstream above the dam, and downstream from above the dam.

**APPENDIX B- Watershed Map**



**APPENDIX C- Map of the State, Highlighting Location of the Watershed**



**APPENDIX D- IDNR Fish Survey Data**

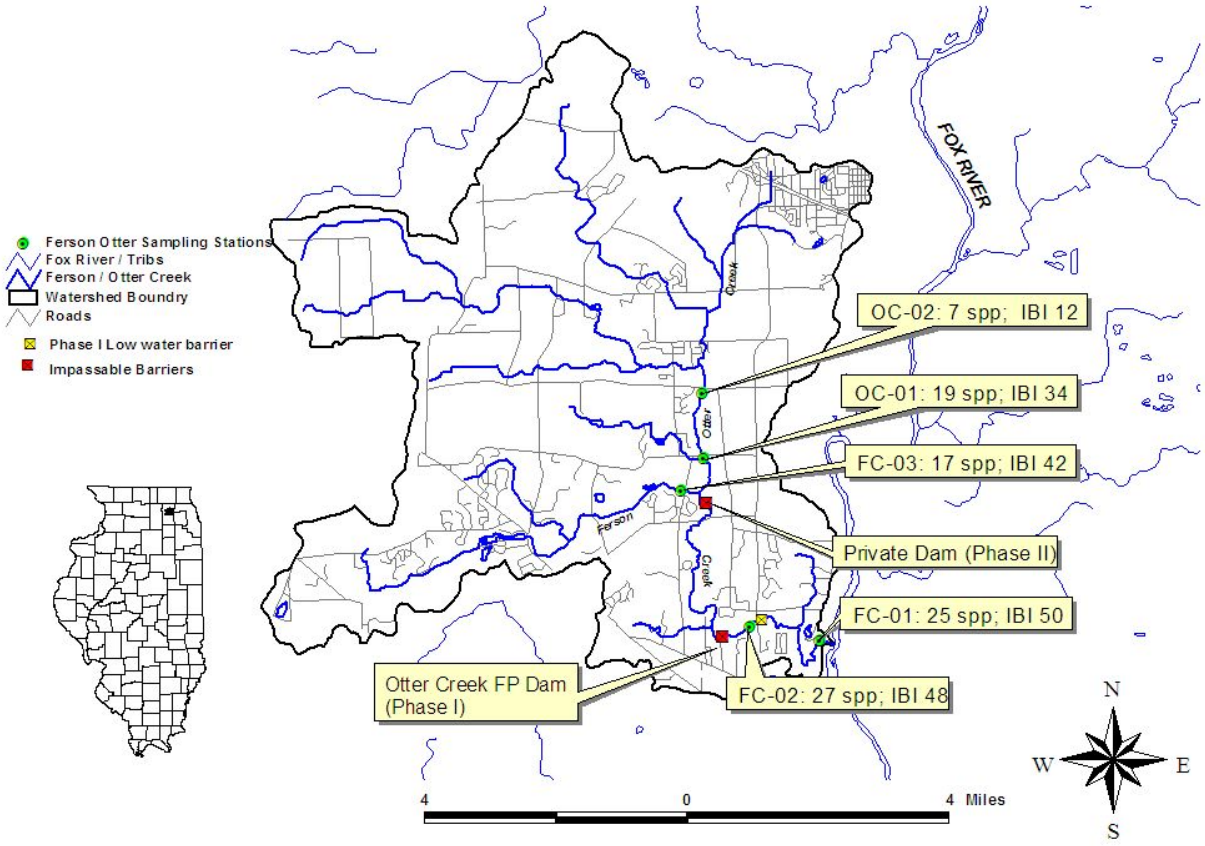



Figure 1. Ferson / Oter Creek Watershed with locations of low water barrier and Otter Creek Forest Preserve Dam to be removed in Phase I, Private Dam slted for removal in Phase II, and location of IIIlinois DNR fish sampling station. (Inset shows Ferson /Otter Creek location in Kane Co., Illinois)

Table 1. Results of Illinois DNR fish community sampling in the Ferson / Otter Creek Watershed 1996 - 2007. Species limited to the lower watershed downstream of impassable dams are highlighted in yellow. (Multiple samples combined or average for FC-02 and OC-01)

| | | Ferson Creek | | | Otter Creek | |
|---|---|---|---|---|---|---|
| Common name | Scientific name | FC-01 | FC-02 | FC-03 | OC-01 | OC-2 |
| Carp | Cyprinus carpio | | X | X | X | X |
| Golden shiner | Notemigonus crysoleucas | | | | X | |
| Creek chub | Semotilus atromaculatus | | X | X | X | X |
| Hornyhead chub | Nocomis biguttatus | X | X | X | X | |
| Central stoneroller | Campostoma anomalum | X | X | X | X | |
| Largescale stoneroller | Campostoma oligolepis | | X | | | |
| Blacknose dace | Rhinichthys atratulus | | X | | | |
| Striped shiner | Luxilus chrysocephalus | | X | X | X | |
| Common shiner | Luxilius cornutus | | X | X | X | X |
| Spotfin shiner | Cyprinella spiloptera | X | | | X | |
| Fathead minnow | Pimephales promelas | | | | X | |
| Bluntnose minnow | Pimephales notatus | X | X | X | X | |
| Emerald shiner | Notropis atherinoides | X | | | | |
| Rosyface shiner | Notropis rubellus | X | | | | |
| Sand shiner | Notropis ludibundus | X | X | | X | |
| White sucker | Catostomus commersoni | X | X | X | X | X |
| Northern hog sucker | Hypentelium nigricans | X | X | X | X | |
| Golden redhorse | Moxostoma erythrurum | X | X | | | |
| Channel catfish | Ictalurus punctatus | X | X | | | |
| Yellow bullhead | Ameiurus natalis | | X | | X | |
| Stonecat | Noturus flavus | X | X | X | X | |
| Tadpole madtom | Noturus gyrinus | X | | | | |
| Mosquitofish | Gambusia affinis | | X | | | |
| Mottled sculpin | Cottus bairdi | X | X | | | |
| Black crappie | Pomoxis nigromaculatus | | X | | | |
| Largemouth bass | Micropterus salmoides | X | X | X | | X |
| Smallmouth bass | Micropterus dolomieu | X | X | | | |
| Green sunfish | Lepomis cyanellus | X | X | X | X | X |
| Bluegill x Green sunfish hybrid | Lepomis macrochirus x L. cyanellus | | X | | | |
| Bluegill | Lepomis macrochirus | X | X | X | X | X |
| Walleye | Stizostedion vitreum | X | | | | |
| Blackside darter | Percina maculata | X | X | | | |
| Slenderhead darter | Percina phoxocephala | X | | | | |
| Logperch | Percina caprodes | X | | | | |
| Johnny darter | Etheostoma nigrum | X | X | X | X | |
| Banded darter | Etheostoma zonale | X | X | X | X | |
| Rainbow darter | Etheostoma caeruleum | | | X | | |
| Fantail darter | Etheostoma flabellare | X | | X | | |
| | Total No. Species | 25 | 27 | 17 | 19 | 7 |
| | Index of Biotic Integrity (*mean) | 50 | 48* | 42 | 34* | 12 |

About

Overview
DOI Employee Guidance
Legislation (Recovery Act)
Summary
Full Text
FAQs about the ActOversight

OIG Recovery Oversight
Report Fraud
Recovery Oversight ReportsBureaus

Bureau of Reclamation
Bureau of Land Management
Indian Affairs
U.S. Fish and Wildlife Service
National Park Service
U.S. Geological Survey
Office of Wildland FirePlans and ReportsContracts and Grants

Recipient Reporting
Grants.gov
DOI Funding Opportunities
Small and Disadvantaged Businesses
FedBizOps (FBO)
Recovery.govContact us

September 24, 2009

# Secretary Salazar Announces Grant Award for Ferson-Otter Creek Fish Passage Restoration in Illinois

Filed under: U.S. Fish and Wildlife Service —

For Immediate Release: September 24, 2009

Contact: Rob Simmonds; (618) 997-6869 x14; Rob_Simmonds@fws.gov
Ashley Spratt; (612) 713-5314; Ashley_Spratt@fws.gov

FFS #R3TC

MARION, IL - Secretary of the Interior Ken Salazar announced a $9,800 grant was awarded to the Kane County Department of Environmental and Building Management to support efforts to remove or modify the Davoust and Creek Bend Forest Preserve Dams, two primary fish passage barriers in the lowermost portion of the Ferson Creek watershed in northeast Illinois. The grant is funded by the American Recovery and Reinvestment Act.

The Davoust Dam is a rock dam comprised of boulders which will be hand manipulated to provide passage for aquatic organisms during all stream flows. The Creek Bend Forest Preserve Dam will be removed and bank stabilization measures will be taken.

“The economic recovery investments that the Department of the Interior is making will create jobs by building trails, restoring habitat, upgrading visitors’ centers, and protecting national treasures in communities across America, while leaving a lasting legacy for our children and grandchildren,” said Secretary Salazar.

The existing barriers in the Ferson-Otter Creek watershed presently impact movements and limit habitat availability for populations of fish and mussels. Restoration of fish passage in the lower Ferson-Otter Creek watershed will be the first step in reconnecting this system to downstream source communities, and

will help to reopen the lower watershed for spawning and nursery habitat. By reconnecting previously fragmented habitat, this project will also provide benefits to the larger Fox River watershed, a tributary to the Illinois River.

"The Midwest Region has a long tradition of enjoying the fish, wildlife, lakes, rivers and prairies we are so fortunate to have," said U.S. Fish and Wildlife Service Midwest Regional Director Tom Melius. "The projects we will undertake in the Midwest as part of ARRA will provide jobs, increase the energy efficiency of government buildings, protect and enhance our natural resources, provide greater opportunities for people to enjoy those natural resources, and perhaps most importantly, help current and future generations understand and share our passion for the natural world."

Future awards will be announced when known. Grant opportunities for all ARRA projects are announced on the Internet at http://www.grants.gov. More information about this and other U.S. Fish and Wildlife Service projects is available at http://recovery.doi.gov/press/bureaus/us-fish-and-wildlife-service.

Funding for these projects and hundreds more across the nation comes from the American Recovery and Reinvestment Act of 2009. Of the $3 billion appropriated to the Department of the Interior, the Act provides $280 million for the U.S. Fish and Wildlife Service – which includes $115 million for construction, repair and energy efficiency retrofit projects at Service facilities, and $165 million for habitat restoration, deferred maintenance and capital improvement projects. The Service will benefit from an additional $10 million, which is administered by the Department of Transportation and is not included in the Service's $280 million appropriation that will be used to rebuild and improve roads on several national wildlife refuges. Projects will immediately create local jobs in the communities where they are located, while stimulating long-term employment and economic opportunities for the American public.

Recovery Act projects address long-standing priority needs identified by the U.S. Fish and Wildlife Service through its capital planning process. The Service worked through a rigorous merit-based process to identify and prioritize investments meeting the criteria put forth in the Recovery Act: namely, that a project addresses the Department's highest priority mission needs; generates the largest number of jobs in the shortest period of time; and creates lasting value for the American public.

Under the American Recovery and Reinvestment Act, the Department of the Interior is making an investment in conserving America's timeless treasures – our stunning natural landscapes, our monuments to liberty, the icons of our culture and heritage – while helping middle class families and their communities prosper again. Interior is also focusing on renewable energy projects, employing youth and promoting community service.

For a full list of funded projects nationwide, go to the Department's Recovery Web Site at http://recovery.doi.gov/. For a list of Service projects, click on the Service's logo at the bottom of the page. Secretary Salazar has pledged unprecedented levels of transparency and accountability in the implementation of the Department of the Interior's economic recovery projects. The public will be able to follow the progress of each project on the recovery web site, which will include an interactive map that enables the public to track where and how the Department's recovery dollars are being spent. In addition, the public can submit questions, comments or concerns at recoveryact@fws.gov.

Secretary Salazar also has appointed a Senior Advisor for Economic Recovery, Chris Henderson, and an Interior Economic Recovery Task Force. Henderson and the Task Force will work closely with the Department of the Interior's Inspector General to ensure the Recovery Program is meeting the high standards for accountability, responsibility and transparency that President Obama has set.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people. We are both a leader and trusted

partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals and commitment to public service. For more information on our work and the people who make it happen, visit www.fws.gov.
Comments Off
DOI Recovery Investments by Bureau
Select a bureau below to learn more about how each is contributing to America's economic recovery.

Illinois Department of Transportation

# Storm Water Pollution Prevention Plan

| | | | |
|---|---|---|---|
| Route | FAU 2505 | Marked Rt. | C.H. 34 (Randall Road) |
| Section | 94-P4008-01-BR | Project No. | TE-00D1(658) |
| County | Kane | Contract No. | 83984 |

This plan has been prepared to comply with the provisions of the NPDES Permit Number ILR10, issued by the Illinois Environmental Protection Agency on May 30, 2003 for storm water discharges from Construction Site Activities. This plan has also been prepared to comply with the provisions of NPDES Permit Number ILR40 for discharges from small municipal separate storm sewer systems if checked below.

NPDES permits associated with this project:

- ☒ ILR10 Permit No. (if applicable): _____
- ☐ ILR40 Permit No. (if applicable): _____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Dennis Ryan
Print Name

Superintendent of Parks and Planning
Title

St. Charles Park District
Agency

Dennis Ryan - St. Charles Park District
Signature

August 29, 2008
Date

## I. Site Description:

A. The following is a description of the project location:

The project is located at the intersection of Randall Road and Silver Glen Road in St. Charles Township in T40N, 3rd PM, Section 8 NE ¼, Section 9 NW ¼. The project is approximately 2/10 miles (1,000 feet) in length and includes a bridge structure that is 0.14 miles (742 feet) from abutment to abutment. The project will be built within the Kane County right-of-way on the north side of Silver Glen Road.

B. The following is a description of the construction activity which is the subject of this plan:

This project features the construction of a bicycle/pedestrian bridge over Randall Road at Silver Glen Road. The superstructure will be composed of steel girders and beams with a reinforced concrete deck and will be supported on reinforced concrete substructures with concrete-filled metal shell pile foundations. The approaches will be supported on mechanically stabilized earth retaining walls. The work includes minor enhancements to the existing bike path, extension of sewers, and pavement markings for a crosswalk. The work includes all incidental and collateral work necessary to complete the project.

C. The following is a description of the intended sequence of major activities which will disturb soils for major portions of the construction site, such as grubbing, excavation and grading:

- Construction of bridge pier foundations.
- Construction of retaining walls.

- Excavation of bike path.
- Grading of bike path approaches and sideslopes.

D. The total area of the construction site is estimated to be 1.07 acres.

The total area of the site that is estimated will be disturbed by excavation, grading or other activities is 1.07 acres.

E. The following is a weighted average of the runoff coefficient for this project after construction activities are completed:

0.45

F. The following is a description of the soil types found at the project site followed by information regarding their erosivity:

Milford silty clay loam drains poorly and the permeability is moderately slow. Markham silt loam is classified as moderately well drainaed and the permeability is low.

G. The following is a description of potentially erosive areas associated with this project:

Both soils have severe restrictions for locals roads and streets as roadfill material due to low strength, frost action, shrink-swell and wetness.

H. The following is a description of soil disturbing activities, their locations, and their erosive factors (e.g. steepness of slopes, length of slopes, etc):

See Section I-C. Fill or cut slopes with a minimum 3:1 sideslopes will be constructed on both sides of the path. The length of the slopes will be approximately 1-15'.

I. See the erosion control plans and/or drainage plans for this contract for information regarding drainage patterns, approximate slopes anticipated before and after major grading activities, locations where vehicles enter or exit the site and controls to prevent offsite sediment tracking (to be added after contractor identifies locations), areas of soil disturbance, the location of major structural and non-structural controls identified in the plan, the location of areas where stabilization practices are expected to occur, surface waters (including wetlands) and locations where storm water is discharged to surface water including wetlands.

J. The following is a list of receiving water(s) and the ultimate receiving water(s), and areal extent of wetland acreage at the site. The location of the receiving waters can be found on the erosion and sediment control plans:

Ferson Creek is located approximately 1 mile southwest of the project.

K. The following pollutants of concern will be associated with this construction project:

| | |
|---|---|
| ☒ Soil Sediment | ☐ Petroleum (gas, diesel, oil, kerosene, hydraulic oil / fluids) |
| ☐ Concrete | ☐ Antifreeze / Coolants |
| ☐ Concrete Truck Waste | ☐ Waste water from cleaning construction equipment |
| ☐ Concrete Curing Compounds | ☐ Other (specify) |
| ☐ Solid Waste Debris | ☐ Other (specify) |
| ☐ Paints | ☐ Other (specify) |
| ☐ Solvents | ☐ Other (specify) |
| ☐ Fertilizers / Pesticides | ☐ Other (specify) |

## II. Controls:

This section of the plan addresses the controls that will be implemented for each of the major construction activities described in I.C. above and for all use areas, borrow sites, and waste sites. For each measure discussed, the contractor will be responsible for its implementation as indicated. The contractor shall provide to the resident engineer a plan for the implementation of the measures indicated. The contractor, and subcontractors, will notify the resident engineer of any proposed changes, maintenance, or modifications to keep construction activities compliant

with the permit. Each such contractor has signed the required certification on forms which are attached to, and are a part of, this plan:

## A. Erosion and Sediment Controls

1. **Stabilized Practices:** Provided below is a description of interim and permanent stabilization practices, including site specific scheduling of the implementation of the practices. Site plans will ensure that existing vegetation is preserved where attainable and disturbed portions of the site will be stabilized. Stabilization practices may include but are not limited to: temporary seeding, permanent seeding, mulching, geotextiles, sodding, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. Except as provided below in II(A)(1)(a) and II(A)(3), stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceases on all disturbed portions of the site where construction will not occur for a period of 21 or more calendar days.

   a. Where the initiation of stabilization measures by the 14th day after construction activity temporarily or permanently ceases is precluded by snow cover, stabilization measures shall be initiated as soon as practicable thereafter.

   The following Stabilization Practices will be used for this project:

| | |
|---|---|
| ☐ Preservation of Mature Vegetation | ☒ Erosion Control Blanket / Mulching |
| ☐ Vegetated Buffer Strips | ☒ Sodding |
| ☐ Protection of Trees | ☐ Geotextiles |
| ☒ Temporary Erosion Control Seeding | ☐ Other (specify) |
| ☐ Temporary Turf (Seeding, Class 7) | ☐ Other (specify) |
| ☐ Temporary Mulching | ☐ Other (specify) |
| ☐ Permanent Seeding | ☐ Other (specify) |

   Describe how the Stabilization Practices listed above will be utilized:

   Temporary measures in accordance with applicable Department standards will be used to control erosion and sedimentation during construction. Temporary erosion seeding will be placed at all disturbed areas. Seeding will be placed as soon as possible to prevent wind and water erosion.

2. **Structural Practices:** Provided below is a description of structural practices that will be implemented, to the degree attainable, to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Such practices may include but are not limited to: perimeter erosion barrier, earth dikes, drainage swales, sediment traps, ditch checks, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. The installation of these devices may be subject to Section 404 of the Clean Water Act.

   The following Structural Practices will be used for this project:

| | |
|---|---|
| ☒ Perimeter Erosion Barrier | ☐ Rock Outlet Protection |
| ☒ Temporary Ditch Check | ☒ Riprap |
| ☒ Storm Drain Inlet Protection | ☐ Gabions |
| ☐ Sediment Trap | ☐ Slope Mattress |
| ☐ Temporary Pipe Slope Drain | ☐ Retaining Walls |
| ☐ Temporary Sediment Basin | ☐ Slope Walls |
| ☐ Temporary Stream Crossing | ☐ Concrete Revetment Mats |
| ☐ Stabilized Construction Exits | ☐ Level Spreaders |
| ☐ Turf Reinforcement Mats | ☐ Other (specify) |
| ☐ Permanent Check Dams | ☐ Other (specify) |
| ☐ Permanent Sediment Basin | ☐ Other (specify) |
| ☐ Aggregate Ditch | ☐ Other (specify) |
| ☐ Paved Ditch | ☐ Other (specify) |

   Describe how the Structural Practices listed above will be utilized:

Sediment control, silt fence will be constructed along the perimeter of the project to prevent sediment from leaving the project.

Inlet and pipe protection will be placed at storm sewer structures to prevent sediment from entering the storm sewer system.

3. **Storm Water Management:** Provided below is a description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. The installation of these devices may be subject to Section 404 of the Clean Water Act.

   a. Such practices may include but are not limited to: storm water detention structures (including wet ponds), storm water retention structures, flow attenuation by use of open vegetated swales and natural depressions, infiltration of runoff on site, and sequential systems (which combine several practices).

      The practices selected for implementation were determined on the basis of the technical guidance in Section 59-8 (Erosion and Sediment Control) in Chapter 59 (Landscape Design and Erosion Control) of the Illinois Department of Transportation Bureau of Design and Environment Manual. If practices other than those discussed in Section 59-8 are selected for implementation or if practices are applied to situations different from those covered in Section 59-8, the technical basis for such decisions will be explained below.

   b. Velocity dissipation devices will be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g. maintenance of hydrologic conditions such as the hydroperiod and hydrodynamics present prior to the initiation of construction activities).

   Description of Storm Water Management Controls.

   Riprap will be installed where the ditch flow enters the proposed storm sewer structures.

4. **Other Controls:**

   a. Vehicle Entrances and Exits – Stabilized construction entrances and exits must be constructed to prevent tracking of sediments onto roadways.

      The contractor will provide the resident engineer with a written plan identifying the location of stabilized entrances and exits and the procedures (s)he will use to construct and maintain them.

   b. Material Delivery, Storage, and Use – The following BMPs shall be implemented to help prevent discharges of construction materials during delivery, storage, and use:
      - All products delivered to the project site must be properly labeled.
      - Water tight shipping containers and/or semi trailers shall be used to store hand tools, small parts, and most construction materials that can be carried by hand, such as paint cans, solvents, and grease.
      - A storage/containment facility should be chosen for larger items such as drums and items shipped or stored on pallets. Such material is to be covered by a tin roof or large sheets of plastic to prevent precipitation from coming in contact with the products being stored.
      - Large items such as light stands, framing materials and lumber shall be stored in the open in a general storage area. Such material shall be elevated with wood blocks to minimize contact with storm water runoff.
      - Spill clean-up materials, material safety data sheets, an inventory of materials, and emergency contact numbers shall be maintained and stored in one designated area and each Contractor is to inform his/her employees and the resident engineer of this location.

   c. Stockpile Management – BMPs shall be implemented to reduce or eliminate pollution of storm water from stockpiles of soil and paving materials such as but not limited to portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, aggregate sub base, and pre-mixed aggregate. The following BMPs may be considered:
      - Perimeter Erosion Barrier

- Temporary Seeding
- Temporary Mulch
- Plastic Covers
- Soil Binders
- Storm Drain Inlet Protection

The contractor will provide the resident engineer with a written plan of the procedures (s)he will use on the project and how they will be maintained.

d. Waste Disposal. No materials, including building materials, shall be discharged into Waters of the State, except as authorized by a Section 404 permit.

e. The provisions of this plan shall ensure and demonstrate compliance with applicable State and/or local waste disposal, sanitary sewer or septic system regulations.

f. The contractor shall provide a written and graphic plan to the resident engineer identifying where each of the above areas will be located and how they are to be managed.

**5. Approved State or Local Laws**

The management practices, controls and provisions contained in this plan will be in accordance with IDOT specifications, which are at least as protective as the requirements contained in the Illinois Environmental Protection Agency's Illinois Urban Manual, 1995. Procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by local officials shall be described or incorporated by reference in the space provided below. Requirements specified in sediment and erosion site plans, site permits, storm water management site plans or site permits approved by local officials that are applicable to protecting surface water resources are, upon submittal of an NOI, to be authorized to discharge under permit ILR10 incorporated by reference and are enforceable under this permit even if they are not specifically included in the plan.

Description of procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by local officials:

In accordance with the current Kane County Stormwater Ordinance and the Kane-DuPage Soil and Water Conservation District.

## III. Maintenance:

The following is a description of procedures that will be used to maintain, in good and effective operating conditions, the vegetation, erosion and sediment control measures and other protective measures identified in this plan. The resident engineer will provide maintenance guides to the contractor for the practices associated with this project.

Inlet and pipe erosion protection controls and sediment control, silt fence will have the sediment removed and be replaced as directed by the engineer. Temporary erosion control systems will be left in place with proper maintenance until permanent erosion control is in place and working properly. The temporary erosion control systems will be removed after the permanent erosion control systems have been established.

## IV. Inspections:

Qualified personnel shall inspect disturbed areas of the construction site which have not yet been finally stabilized, structural control measures, and locations where vehicles and equipment enter and exit the site. Such inspections shall be conducted at least once every seven (7) calendar days and within 24 hours of the end of a storm that is 0.5 inches or greater or equivalent snowfall.

A. Disturbed areas, use areas (storage of materials, stockpiles, machine maintenance, fueling, etc.), borrow sites, and waste sites shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the plan shall be observed to ensure that they are operating correctly. Discharge locations or points that are accessible, shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles enter or exit the site shall be inspected for evidence of off site sediment tracking.

B. Based on the results of the inspection, the description of potential pollutant sources identified in section I above and pollution prevention measures identified in section II above shall be revised as appropriate as soon as practicable after such inspection. Any changes to this plan resulting from the required inspections shall be implemented within ½ hour to 1 week based on the urgency of the situation. The resident engineer will notify the contractor of the time required to implement such actions through the weekly inspection report.

C. A report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of this storm water pollution prevention plan, and actions taken in accordance with section IV(B) shall be made and retained as part of the plan for at least three (3) years after the date of the inspection. The report shall be signed in accordance with Part VI. G of the general permit.

D. If any violation of the provisions of this plan is identified during the conduct of the construction work covered by this plan, the resident engineer shall complete and file an "Incidence of Noncompliance" (ION) report for the identified violation. The resident engineer shall use forms provided by the Illinois Environmental Protection Agency and shall include specific information on the cause of noncompliance, actions which were taken to prevent any further causes of noncompliance, and a statement detailing any environmental impact which may have resulted from the noncompliance. All reports of noncompliance shall be signed by a responsible authority in accordance with Part VI. G of the general permit.

The Incidence of Non-Compliance shall be mailed to the following address:

Illinois Environmental Protection Agency
Division of Water Pollution Control
Attn: Compliance Assurance Section
1021 North Grand East
Post Office Box 19276
Springfield, Illinois 62794-9276

## V. Non-Storm Water Discharges:

Except for flows from fire fighting activities, sources of non-storm water that is combined with storm water discharges associated with the industrial activity addressed in this plan must be described below. Appropriate pollution prevention measures, as described below, will be implemented for the non-storm water component(s) of the discharge.

A. Spill Prevention and Control – BMPs shall be implemented to contain and clean-up spills and prevent material discharges to the storm drain system. The contractor shall produce a written plan stating how his/her company will prevent, report, and clean up spills and provide a copy to all of his/her employees and the resident engineer. The contractor shall notify all of his/her employees on the proper protocol for reporting spills. The contractor shall notify the resident engineer of any spills immediately.

B. Concrete Residuals and Washout Wastes – The following BMPs shall be implemented to control residual concrete, concrete sediments, and rinse water:
   - Temporary Concrete Washout Facilities shall be constructed for rinsing out concrete trucks. Signs shall be installed directing concrete truck drivers where designated washout facilities are located.
   - The contractor shall have the location of temporary concrete washout facilities approved by the resident engineer.
   - All temporary concrete washout facilities are to be inspected by the contractor after each use and all spills must be reported to the resident engineer and cleaned up immediately.
   - Concrete waste solids/liquids shall be disposed of properly.

C. Litter Management – A proper number of dumpsters shall be provided on site to handle debris and litter associated with the project. The Contractor is responsible for ensuring his/her employees place all litter including marking paint cans, soda cans, food wrappers, wood lathe, marking ribbon, construction string, and all other construction related litter in the proper dumpsters.

D. Vehicle and Equipment Cleaning – Vehicles and equipment are to be cleaned in designated areas only, preferably off site.

E. Vehicle and Equipment Fueling – A variety of BMPs can be implemented during fueling of vehicles and equipment to prevent pollution. The contractor shall inform the resident engineer as to which BMPs will be used on the project. The contractor shall inform the resident engineer how (s)he will be informing his/her employees of these BMPs (i.e. signs, training, etc.). Below are a few examples of these BMPs:
   - Containment
   - Spill Prevention and Control
   - Use of Drip Pans and Absorbents
   - Automatic Shut-Off Nozzles
   - Topping Off Restrictions
   - Leak Inspection and Repair

F. Vehicle and Equipment Maintenance – On site maintenance must be performed in accordance with all environmental laws such as proper storage and no dumping of old engine oil or other fluids on site.

## VI. Failure to Comply:

Failure to comply with any provisions of this Storm Water Pollution Prevention Plan will result in the implementation of an Erosion and Sediment Control Deficiency Deduction against the contractor and/or penalties under the NPDES permit which could be passed onto the contractor.

Illinois Department of Transportation

## Contractor Certification Statement

The Resident Engineer is to make copies of this form and every contractor and sub-contractor will be required to complete their own separate form.

This certification statement is part of the Storm Water Pollution Prevention Plan for the project described below, in accordance with General NPDES Permit No. ILR10 issued by the Illinois Environmental Protection Agency.

| | | | |
|---|---|---|---|
| Route | FAU 2505 | Marked Rt. | C.H. 34 (Randall Road) |
| Section | 94-P4008-01-BR | Project No. | TE-00D1(658) |
| County | Kane | Contract No. | 83984 |

I certify under penalty of law that I understand the terms of the general National Pollutant Discharge Elimination System (NPDES) permit (ILR 10) that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification. I have read and understand all of the information and requirements stated in the Storm Water Pollution Prevention Plan for the above mentioned project. I have provided all documentation required to be in compliance with the ILR10 and Storm Water Pollution Prevention Plan and will provide timely updates to these documents as necessary.

☒ Contractor

☐ Sub-Contractor

Leo Wilkes
Print Name

Leo Wilkes
Signature

Project Manager
Title

3-18-2009
Date

Herlihy Mid-Continent
Name of Firm

630-378-1000 X106
Telephone

1306 Marquette Drive
Street Address

Romeoville IL 60446
City/State/ZIP

IEPA Log No.: **C-0127-03**
CoE appl. #: **200300376**

Public Notice Beginning Date: **October 4, 2006**
Public Notice Ending Date: **November 3, 2006**

Section 401 of the Federal Water Pollution Control Act
Amendments of 1972

**Section 401 Water Quality Certification to Discharge into Waters of the State**

**Public Notice/Fact Sheet Issued By:**

Illinois Environmental Protection Agency
Bureau of Water
Watershed Management Section
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276
217/782-3362

**Name and Address of Discharger:** City of Elgin, 150 Dexter Court, Elgin, IL 60120

**Discharge Location:** Section 21, T41N, R8E of the 3rd P.M. in Kane County within Elgin

**Name of Receiving Water:** Unnamed Tributary to Otter Creek, Unnamed Ponds, and Unnamed Wetlands

**Project Description:** Spartan Drive Extension. Construction will impact 0.7-acre of wetlands and waters of the US. Mitigation for these impacts will be through channel reconstruction and the purchasing of mitigation credits from an approved wetland mitigation bank.

The Illinois Environmental Protection Agency (IEPA) has received an application for a Section 401 water quality certification to discharge into the waters of the state associated with a Section 404 permit application received by the U.S. Army Corps of Engineers. The Public Notice period will begin and end on the dates indicated in the heading of this Public Notice. The last day comments will be received will be on the Public Notice period ending date unless a commenter demonstrating the need for additional time requests an extension to this comment period and the request is granted by the IEPA. Interested persons are invited to submit written comments on the project to the IEPA at the above address. Commenters shall provide their names and addresses along with comments on the certification application. Commenters may include a request for public hearing. The certification and notice number(s) must appear on each comment page.

The attached Fact Sheet provides a description of the project and the antidegradation assessment.

The application, Public Notice/Fact Sheet, comments received, and other documents are available for inspection and may be copied at the IEPA at the address shown above between 9:30 a.m. and 3:30 p.m. Monday through Friday when scheduled by the interested person.

If written comments or requests indicate a significant degree of public interest in the certification application, the IEPA may, at its discretion, hold a public hearing. Public notice will be given 30 days before any public hearing. If a Section 401 water quality certification is issued, response to relevant comments will be provided at the time of the certification. For further information, please call Thaddeus Faught at 217/782-3362.

TJF:0127-03PN.doc

**Fact Sheet for Antidegradation Assessment**
**For City of Elgin – Spartan Drive Extension – Unnamed Tributary to Otter Creek, Unnamed Ponds, and Unnamed Wetlands – Kane County**
**IEPA Log No. C-0127-03**
**COE Log No. 200300376**
**Contact: Alyson Grady; 217/558-2012**
**October 4, 2006**

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The applicant has applied for 401 water quality certification for the proposed impact of 0.70-acre of wetlands and waters of the U.S. located in Section 21, Township 41 North, Range 8 East, Kane County, Illinois. This impact will facilitate the extension of Spartan Drive. The extension of Spartan Drive will provide increased public access to Elgin Community College and fill a local arterial void on the southwest side of Elgin. The project will include stormwater collection, conveyance and detention. Five wetlands and five waters of the U.S. were identified within the project area, totaling 5.37 acres. The proposed project will impact 0.70-acre of wetlands and waters of the U.S. Of the 0.70-acre impacts to wetlands and waters of the U.S., 0.57-acre will be permanently impacted. These impacts include 0.33-acre of impact to an unnamed tributary to Otter Creek and adjacent wetland through the relocation of approximately 1,350 linear feet of channel. The channel will be relocated to the west of the existing channel. The new channel will be approximately 1,100 linear feet and the banks regarded to a 4:1 slope. The new channel, banks, and adjacent buffer will all be planted with native vegetation to promote infiltration. The adjacent buffer will be 50 feet wide for a total of 1.2 acres of native buffer. Additionally, 0.08-acre of Wetland 2 will be filled through the installation of a 6x3 pre-cast concrete box culvert that spans 272 lineal feet in addition to 128 square yard of riprap. Waters of the U.S. #3 will receive 0.13-acre of permanent impact and Waters of the U.S. #4 will receive 0.03-acre of permanent impact. These two waters are water hazards on the Spartan Meadows Golf Course. The impacts to Waters of the U.S. #3 will include 90 linear feet of 48-inch reinforced concrete pipe and headwalls installed to maintain the hydrological connectivity of surface water and groundwater. The impacts to Waters of the U.S. #4 are due to the roadway construction. A 12-inch corrugated metal pipe that connects Waters 3 and 4 will be removed because Waters of the U.S. #4 will be incorporated into a wetland bottom detention basin. This basin will serve the off-site stormwater from the Cottage Green development. The basin will be planted with native wetland vegetation and will have a 50-foot native prairie buffer. The temporary impacts are proposed as follows: 0.02-acre to Wetland 1, 0.08-acre additional to Waters of the U.S. #3, and 0.03-acre additional to Waters of the U.S. #4. The temporary impacts are due to the use of sheetpile for dewatering. The applicant proposes to mitigate the impacts to Waters of the U.S. #1 through the reconstructed channel, vegetation, and 50-foot native vegetation buffer. The remaining permanent wetland impacts, totaling 0.24-acre, would be mitigated at a 1:1 ratio through the purchase of wetland mitigation bank credits from either the Otter Creek Bank or Ferson Creek Bank. The applicant is proposing the 1:1 ratio due to the use of Best Management Practices on-site, including the creation of wetland bottom detention basin and the use of native vegetation throughout the site.

**Identification and Characterization of the Affected Water Body.**

The unnamed tributary to Otter Creek has a zero 7Q10 flow and is a General Use water. The tributary is not found on the 2006 Illinois 303(d) List nor is it rated under the Agency's Biological Stream Characterization (BSC) system. The tributary is not listed as a biologically significant water body in the Illinois Natural History Survey publication Biologically Significant Illinois Streams. According to the IDNR WIRT system, no threatened or endangered species are known within the proposed project area. The tributary is unvegetated and varies from five to fifteen feet wide. The creek bed consists of a mixture of silt and gravel.

Water of the U.S. #3 and #4 are General Use waters. They are open water ponds located on the golf course. They are not found on the 2006 Illinois 303(d) List nor are they rated under the Agency's Biological Stream Characterization (BSC) system. These ponds are not listed as a biologically significant water bodies in the Illinois Natural History Survey publication Biologically Significant Illinois Streams. The ponds are unvegetated and surrounded by manicured fairway turf grass. The ponds taper to wetland ditches on their northern ends. The ponds were constructed as water hazards and/or irrigation supply reservoirs for the golf course. Waters of the U.S. #4 currently received some stormwater runoff from the Cottage Green development.

The wetlands have a zero 7Q10 flow and are General Use waters. They are not found on the draft 2002 Illinois 303(d) report nor are they rated under the Agency's Biological Stream Characterization (BSC) system. The wetlands are not listed as a biologically significant water bodies in the Illinois Natural History Survey publication Biologically Significant Illinois Streams.

Wetland 1 is a 0.1-acre wetland swale that is contiguous with the unnamed tributary to Otter Creek. The swale is dominated by reed canary grass, narrow-leaved cattail, and common arrowhead. The Floristic Quality Index (FQI) for the wetland is 11.2. Impacts to Wetland 1 are proposed to be temporary.

Wetland 2 is a 0.4-acre wetland fringe located adjacent to the unnamed tributary to Otter Creek north of the proposed relocated section. The wetland is dominated by reed canary grass, narrow-leaved cattail, lake sedge, red-rooted spike rush, and stinging nettle. The FQI for the wetland is 8.7. Wetland 2 is proposed to receive 0.08-acre of permanent impacts.

**Identification of Proposed Pollutant Load Increases or Potential Impacts on Uses.**

Construction of the proposed project may cause a temporary increase in suspended solids both within the project area and downstream. Erosion control measures will need to be utilized to minimize the increase. The proposed impact of the unnamed tributary will alter the current habitat. The new channel will be constructed and vegetated with native vegetation. Mitigation for the proposed impacts is proposed both on-site through the channel reconstruction and off-site through the purchase of wetland mitigation bank credits.

**Purpose and Anticipated Benefits of the Proposed Activity.**

This project will allow the extension of Spartan Drive, providing better public access to Elgin Community College and increased traffic safety for the community.

**Assessments of Alternatives for Less Increase in Loading or Minimal Environmental Degradation.**

The construction of the proposed project will follow guidelines set forth by the Agency and COE. Measures will need to be taken to eliminate any impacts to the remaining wetlands and waters of the U.S. Alternative alignments for the road expansion were considered. A southern route was the least expensive and had the least impacts. However, it provided Elgin Community College the least amount of land for expansion of the college facilities. A northern route would impact Otter Creek at only one crossing. However, it would impact more wetland acreage and would be longer, increasing the cost to build it. The least intrusive alternative would be to not extend the road and not impact the wetlands and waters of the U.S. This is not an acceptable alternative given that this is a useful project and will provide the community with better access to the community college and increased traffic safety.

**Summary Comments of the Illinois Department of Natural Resources, Regional Planning Commissions, Zoning Boards or Other Entities**

In a letter from Richard Lewis dated March 7, 2003, IDNR indicated that the Natural Heritage Database contains no records of State-listed threatened or endangered species, Illinois natural Area Inventory sites, or dedicated Illinois Nature Preserves in the vicinity. Consultation is terminated.

In a letter from Robert Schanzle dated December 7, 2005, IDNR indicated again that there are no records of threatened/endangered species or identified natural areas in the vicinity of the project. IDNR Office of Realty and Environmental Planning has no objections to the issuance of a permit; however, they do have two recommendations. First, IDNR suggests that the mitigation ratio be a minimum of 1.5:1. Second, the relocated channel is to be planted with native emergent and wet prairie plantings. According to the species list on the landscape plans, the list consists entirely of mesic prairie species. IDNR recommends that this list be amended.

The applicant has revised the landscaping plan to contain emergent and wet prairie plantings in areas that will support them.

**Agency Conclusion.**

This assessment was conducted pursuant to the Illinois Pollution Control Board regulation for Antidegradation found at 35 Ill. Adm. Code 302.105 (Antidegradation standard). We find that the proposed activity will result in the attainment of water quality standards. All technically and economically reasonable measures to avoid or minimize the extent of the proposed increase in pollutant loading have been incorporated into the proposed activity. This activity will benefit the community at large by providing better access to the community college and increasing traffic safety. The proposed activity is therefore compliant with the Antidegradation standard.

# Stream Monitoring

A stream is a combination of all of its physical, chemical, and biological characteristics, characteristics which respond to natural and human-caused events, such as flooding, drought, construction, or channelization. We can measure the extent to which these conditions have affected a stream by observing the number and type of organisms living in the stream and relating that information to the surrounding habitat. The biological monitoring procedures in this publication are for wadeable, small to medium-sized streams.

## Biological Survey

Biological monitoring focuses on the organisms living in a stream. Scientists observe changes in the types of organisms in a stream to determine the richness of the biological community. They also observe the total number of organisms present, which is a measure of the density of the biological community. If community richness and community density change over time, it may indicate the effects of human activity.

Biological stream monitoring is based on the fact that different species react to pollution in different ways. Pollution-sensitive organisms are more susceptible than others to the effects of physical or chemical changes in a stream. Pollution-tolerant organisms can cope with adverse conditions more easily.

The presence or absence of such indicator organisms is an indirect measure of pollution. When a stream becomes polluted, pollution-sensitive organisms decrease in number or disappear, while pollution-tolerant organisms remain stable or increase in number.

The indicator organisms are benthic macroinvertebrates, animals big enough to see with the naked eye (macro). Benthic macroinvertebrates lack backbones (invertebrates) and live at least part of their life cycles in or on the bottom of a body of water (benthos).

Benthic macroinvertebrates include aquatic insects (such as mayflies, stoneflies, caddisflies, midges, and beetles), snails, worms, freshwater clams, mussels, and crayfish. Some benthic macroinvertebrates, like midges, are small and may grow no larger than one-half inch in length. Others, like the three-ridge mussel can be more than ten inches long.

In addition to being sensitive to changes in the stream's overall ecological integrity, benthic macroinvertebrates have other advantages as indictor organisms.

- They are relatively easy to sample. Benthic macroinvertebrates are abundant and can be easily collected and identified.
- They are relatively immobile. Animals such as fishes can escape toxic spills or degraded habitats by swimming away, and migratory animals may spend only a small portion of their life cycle in a particular stream before moving on. Changes in populations of mobile species thus do not necessarily signal changes in the stream.
- In contrast, most macroinvertebrates spend a large part of their life cycle (often more than a year) in the same part of a stream, clinging to surfaces so as not to be swept away with the water's current. When such stable communities change over time, it often indicates problems in the stream.
- They are continuous indicators of environmental quality. The composition of benthic macroinvertebrate communities in a stream reflects the stream's physical and chemical conditions over time. In contrast, monitoring for certain water qualities (such as the amount of oxygen dissolved in it) describes the condition of the water only at the time the samples were taken.
- They are a critical part of the aquatic food web. Benthic macroinvertebrates form a vital link in the web that connects

aquatic plants, algae, and leaf litter to the fish species of our rivers and streams. Therefore, the condition of the benthic macroinvertebrate community reflects the stability and diversity of the larger aquatic food web.

**Life cycles of benthic macroinvertebrates**

Most of the benthic macroinvertebrates that you will encounter are aquatic insects. Aquatic insects have complex life cycles and live in the water only during certain stages of their development.

Aquatic insects may go through one of two kinds of development, or metamorphosis. Aquatic insects that have complete metamorphosis undergo four stages of development. They lay their eggs in water, and they hatch into larvae that feed and grow in the water. (These larval insects do not resemble the adult insects; many appear worm-like.) The fully-grown larvae develop into pupae that do not feed while they develop the many organs and structures they need as adults, such as wings and antennae.

The fully-formed adults of some species (midges and flies, for example) emerge from the water and live in the habitat surrounding the stream. Others, such as riffle beetles, continue to live in the stream itself. After mating, adults of all aquatic insect species lay eggs in the water, beginning the life cycle all over again.

Aquatic insects that have incomplete metamorphosis undergo only three stages of development. The eggs hatch into larvae, which feed and grow in the water while they develop adult structures and organs; they do this in stages, or instars, until they emerge as adults. The life cycle begins again when eggs are laid in the water by the adults.

## *Habitat Survey*

**Streams, watersheds and drainage basins**
Habitat surveys describe conditions in the stream itself, including the areas immediately surrounding the stream. Information gained from the surveys helps to explain changes in stream life identified by biological monitoring. In much the same way, the number and variety of the organisms present in a stream is a useful measure of the health of that habitat.

Habitat surveys are also useful for classifying streams and for documenting how they change over time. For example, many streams in Illinois have had their channels straightened or dammed and their banks cleared. Such changes have destroyed habitats both within and alongside streams. The loss of these habitats has led to the loss of many aquatic organisms, including whole species of fish, freshwater mussels, crayfish, and aquatic insects. Habitat surveys catalog the nature and extent of these kinds of changes.

Stream habitats are complex and assessing their quality requires understanding their many parts.

**Streams.** Streams may begin when water flows from ponds or lakes, or they may arise from below-ground, from springs or seepage areas. Such "beginner" streams are small, and are referred to as *headwater streams*. Headwaters flow toward lower-lying land downstream; as they go, they converge with one or more other headwater streams to form medium-sized streams. Medium-sized streams then flow and converge with other streams (either headwater or medium-sized streams) and form rivers.

**Watersheds and drainage basins.** The area of land from which water drains into a given stream is referred to as that stream's watershed. A river's drainage basin is a watershed on a bigger scale—that area of land, including watersheds of headwater streams and medium-sized streams, from which all of the river's water drains.

Since all of the water in a drainage basin flows to a common point, conditions in the headwater

streams affect the larger streams and rivers fed by them. Monitoring the conditions in headwater streams thus gives clues to conditions downstream.

**Stream channels.** The part of a stream in which the water flows is the stream channel. The physical characteristics of the stream channel will differ depending on the topography and geology of the area around it. Often the same stream will change at different points along its length as the shape and makeup of the surrounding land changes. Such a stream may contain successive segments (or reaches) that are quite different from each other.

**Riparian zones.** The riparian zone refers to the area of land which is connected with or immediately adjacent to the banks of a stream. It includes the stream banks, wetlands and those portions of floodplains and valley bottoms that support riparian vegetation—the plants found in the riparian zone. The lower stream banks, where the land meets the water, may be home to emergent vegetation—plants that are rooted in the soil below the water, but grow to heights above the water level.

The upper stream banks may have plants that are rooted in the soil, but which can withstand periodic flooding. When the riparian zone is periodically flooded after heavy rains, food, water, and *sediment* are carried into the stream from the surrounding landscape. Plants growing within the riparian zone hold the soil of the stream's banks in place, helping to prevent erosion.

The plants also provide habitat for macroinvertebrates and other organisms, such as fishes, during floods.

Riparian vegetation, such as trees and shrubs, also influences the amount of sunlight and heat reaching the stream channel. If a stream has no trees or shrubs to shade the water, the temperature becomes too high for most macroinvertebrates to survive. Too much shade would block all sunlight, preventing any algae or aquatic plants from growing in the stream.

The amount of shading provided by the trees and shrubs in the riparian zone helps provide the correct amount of heat and light for macroinvertebrates, fishes and plants.

**Stream bottoms**
In Illinois, the substrate, or bottom, of most stream reaches is either rocky or soft. The bottom along a soft bottom reach is composed of sand, soft mud, or a mixture of both. The bottom of a rocky bottom reach consists of rocks or gravel.

A **rocky bottom reach** is composed of three different but interrelated habitats known as riffles, pools, and runs.

**Riffles** are areas of turbulent water created by shallow water passing through or over stones or gravel of fairly uniform size. Riffles are excellent places to collect macroinvertebrates. The gravel and rocks of a riffle create nooks and crannies that macroinvertebrates can cling to, crawl under, and hide behind.

Stones in sunlit areas of a riffle are often covered with algae and mosses on which certain stream organisms feed. Leaves and other plant material drifting in the stream current also provide food for some macroinvertebrates in riffle areas. As water tumbles over rocks and gravel in a riffle, oxygen from the air is mixed with it, providing the high levels of dissolved oxygen needed by many benthic macroinvertebrates.

**Runs** are stretches of quieter water commonly found between riffles and pools in larger streams and rivers. Runs have a moderate current and are slightly deeper than riffles.

**Pools** are found both upstream and downstream from riffles. Pools are deeper parts of the stream with relatively slower-moving water. Water in pools differs from the water in other stretches of a river in its chemistry, depth, and speed of

current. Pools are catch basins of organic materials.

As the current enters a pool it slows down; as it no longer has the energy to carry it, the heavier part of its load of sediment drops to the bottom. Pools usually have larger organisms living in them that have adapted to these habitats. For example, crayfish feed on organic matter that collects in the pool bottoms.

As noted, riffles, runs, and pools are interrelated habitats. The waters of a pool are affected by what occurs in upstream riffles, and the waters of the riffles are affected by upstream pools.

Although pools, runs, and riffles are more or less distinct environments, many organisms inhabit all of them. (Fishes, for example, can move among all three.) Some animals of the riffles are carried by the current to downstream pools and/or runs. Many organisms of rocky bottom reaches find food in the riffles of a stream but take shelter in its pools.

A **soft bottom reach** does not have riffle-run-pool habitats. In these reaches, some macroinvertebrates burrow into the sediment of the stream (midge larvae and worms, for example), while others live in or on submerged and floating logs, submerged roots, vegetation, rip rap along the shore line, or in any leaf or organic debris.

# GETTING STARTED

***Find a Partner/Form a Team***

For safety reasons, you should never monitor without at least one other person present. Individuals should find a monitoring partner. Groups should form teams of three to five volunteers per site.

***Select a Monitoring Site***

- Identify a site.

***Complete Site Documentation***

Once a suitable monitoring site has been identified, proper site identification information must be completed.

- **Site Evaluation Form** This form describes specific (on-site) location of the site, access points, suitability of the site, and landowner permission status.
- **Site Identification Form** This form describes the general (roadmap) location of the site, legal description, longitude/ latitude coordinates and other location information.
- **Property Access Agreement Form** This form documents the landowner's or manager's permission to access the site for evaluation and monitoring purposes. It must be completed before monitoring starts.

One or more maps (topographic maps, local road maps, etc.) indicating the location of the site should be included.

***Monitoring Equipment***

Most items can be obtained from any household or local retail supplier.

- Tape measure or twine at least 50-feet long and marked off in one-tenth foot lengths
- Thermometer
- Compass
- Stopwatch or any watch with a second hand
- Small float to measure velocity - a small orange or practice golf ball will work
- White tray marked with a grid of squares of known area (such as 5 cm by 5 cm) to use in sub-sampling - a photographic developing tray works well
- Jar of 70% alcohol, or isopropyl alcohol
- Bottle of soda water or a thermos of ice cold water (do not use carbonated mineral water or other beverage)
- Several small jars with lids

- Pencils
- Sampling labels (small slips of paper of at least one inch by two inches in size, and some tape)
- 3-5 gallon bucket
- Hand lens or magnifying glass of at least 8x magnification
- Tweezers or forceps
- Fine-mesh (0.5 mm) D-frame or triangular dip net with a frame at least 12 inches wide
- Stream Monitoring Manual
- Field data sheets, photocopied from Appendix D
- Water bottle

<u>Personal & safety equipment</u>

- Reference maps indicating general information pertinent to the monitoring area, including nearby roads
- Walking stick of known length
- Boots or waders; tow line and life jackets - be sure that chest waders have a belt
- Rubber gloves
- Camera
- Calculator
- Insect repellent, sun screen, sun glasses, and a hat
- Whistle
- Towel
- Fire starter
- Small first aid kit, flashlight, and extra batteries
- Water for drinking
- Water and soap for washing hands

***Plan***

- Make a quick visit to your site at least one day prior to monitoring to ensure safe monitoring conditions.
- **Always** contact the owner or manager of the property on which your site is located to notify him/her of your plans. This should be done a week in advance of your monitoring date, but no less than 24 hours prior to monitoring.

***Conduct Your Survey***

Procedures for conducting your habitat and biological surveys are described in the chapters that follow.

***Safety***

The following precautions should be observed while doing field sampling of any kind.

- Before leaving for your site, let someone know where you are going and when you will be expected back.
- Always work in groups, or with partners; do not collect information alone, reschedule for a time when other volunteers are available.
- Do not collect samples under difficult conditions. Make allowances for your own physical limitations.
- Do not walk on unstable banks. Be careful when stepping on rocks and wood, as they may be slippery when wet. Bring along or find a suitable walking stick for balance while climbing down steep banks or wading.
- Do not attempt to cross streams that are swift and above the knee in depth. A stream bed can be very slippery and dangerous in places. If you are unsure about the velocity of the water, take a quick velocity and depth measurement (see page 9) and multiply the numbers. If they equal nine or above, the stream is not safe.
- Do not cross private property without the landowner's permission. Use the public access points (e.g., city or state roads and parks) to approach a monitoring site.
- Bring your own fresh water to drink.
- Disturb streamside vegetation as little as possible. Watch out for poison ivy, which commonly grows on stream banks.
- Wash hands with soap and potable water at the end of the monitoring exercise, and before eating.

- Wear shoes rather than sandals or open-toed shoes. If chest waders are worn, they must be secured at the waist with a belt.
- Wear a life vest.
- If for any reason you do not feel safe monitoring your stream, reschedule to monitor at another time.

# HABITAT SURVEY

**YOU WILL NEED**

- Site Sketch Sheet and Habitat Survey Data Sheet
- Clip board and pencil or pen
- Graduated 50-foot length of rope, or a measuring tape in engineering rule (marked off in tenths of a foot)
- A watch with a second hand or a stopwatch
- An orange or similar biodegradable object or a practice golf ball
- Thermometer
- Empty jar
- Calculator

**Mark Off Your Site**

If the site is located by a bridge, measure 100 feet upstream from it. If for some reason a sample cannot be taken upstream from the bridge (for example, no safe access or owner permission) then measure 100 feet downstream from the bridge, noting it on your Habitat Survey Sheet. Begin mapping the area at this point. If the site is in an area of public ownership, such as a state park or forest preserve, and there are no physical obstructions nearby (such as bridges or dams), map the site beginning at the location assigned.

**Make a Site Sketch**

Sketch a map of your monitoring site to become familiar with the terrain and stream features and to provide a record of conditions.

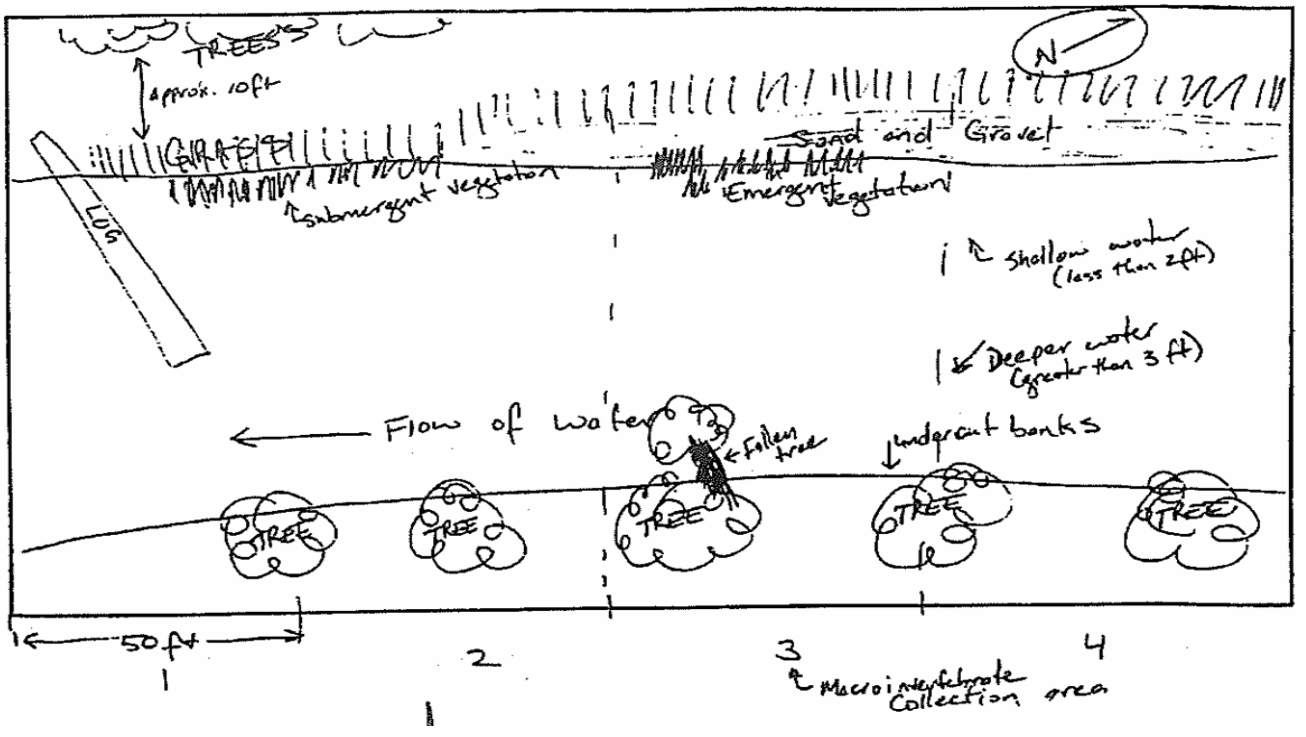



Figure 1. A sketch of a 200-foot study reach.

1. Using a tape measure or your 50-foot length of string, measure four 50-foot lengths along either side of the stream upstream from the starting point (for a total of 200 feet). This marks the study reach that will be the focus of your sampling activities.
2. Make a sketch of the study reach on the Site Sketch sheet. Draw the sketch to appear as if you are observing the area from above (Figure 1).
3. Use a compass or topo map to determine which direction is North and note it on the sheet.
4. Draw an arrow to indicate the direction the water is moving. Note the location of riffles, runs, pools, ditches, wetlands, dams, rip rap, tributaries, landscape features, vegetation, and roads. Include important features outside the 200-foot study reach, but show that they are outside the reach.
5. Take a photo of the 200-foot study reach to document conditions at the site or on that date. The photo will be compared to future photos to illustrate conditions over time.

**Complete the Habitat Survey Data Sheet**

1. **Present weather/weather in past 48 hours.** If conditions were mixed over the past 48 hours (e.g., stormy two days ago, clear and sunny one day ago) select the weather condition that describes the worst recent weather.

2. **Water appearance.** Select the term or terms that best describe the physical appearance of the water, which can be an indicator of water pollution. Because the stream bottom can alter the apparent color of the water, put some stream water in a white tray or bucket, or fill a clear bottle and place a white sheet of paper behind the bottle. Then check all of the following that apply.
    - **Clear** – colorless, transparent.
    - **Milky –** cloudy-white or gray; not transparent. May be natural or due to pollution.
    - **Foamy –** caused by both nature or pollution from excessive nutrients or detergents.
    - **Dark Brown –** may indicate that acids are being released into the stream from decaying plants. This process occurs naturally in the fall of the year.
    - **Oily Sheen –** a multicolored reflection on the surface of the water. Can occur naturally or may indicate oil floating in the stream.
    - **Reddish –** may indicate acids draining into the water.
    - **Green –** may indicate excess nutrients being released into the stream.
    - **Other –** any other observation regarding water color not described above.

3. **Turbidity.** Turbidity describes the amount of sediment suspended in the water. Turbid water is usually cloudy or brown due to the presence of excessive silt or organic material.

    Check the level of turbidity that best describes the amount of suspended sediment present.

4. **Water Odor.** Odor can also be a physical indicator of water pollution.
    - None – indicates good water quality.
    - Sewage – may indicate the release of human waste material. (See note below.)
    - Chlorine – may indicate that a sewage treatment plant is over-chlorinating its effluent.
    - Fish – may indicate the presence of excessive algal growth or dead fishes.

- Rotten Eggs – a sulfurous smell that may indicate sewage pollution, as hydrogen sulfide gas is a product of sewage decomposition. (See note below).
- Petroleum – may indicate an oil spill from marine or terrestrial sources.
- Other

Note: If you smell sewage or rotten eggs, do not enter the water.

5. **Temperature**. Temperature can limit biological activity in streams because many aquatic organisms need water of specific temperatures (for example, to breed). Also, since cold water holds more dissolved oxygen than warm water, temperature directly affects the amount of oxygen available to organisms.

To measure water temperature, submerge a thermometer in a stream run for at least two minutes. To measure air temperature, hold a thermometer in the air for about two minutes.

6. **Algal Growth**. Algae are an important food source and a habitat for many organisms. However, excessive algal growth is an indicator of possible nutrient problems. Estimate what percentage of the bottom of the 200-foot site is covered by algae.

7. **Submerged Aquatic Plants.** These plants have their roots in the stream bottom, and the whole plant remains under water. Indicate by yes or no if you notice any rooted, vascular plants underneath the water's surface in your 200-foot site. If you know the names of these plants, whether common or scientific, write them in the space provided.

8. **Riparian (streamside) Vegetation.** Identify the riparian vegetation by name. If you do not know the specific names of the plants that you see, describe them generically as "ferns" or "small bushes" or "grasses," etc.

9. **Canopy Cover.** Estimate the percentage of the 200-foot study reach that is presently shaded by trees and shrubs.

10. **Bottom Substrate**. Bottom substrate is the material in and on the stream bottom that macroinvertebrates attach to, feed from, or crawl on. Estimate the percentage of each substrate material present; your estimate should equal 100% for all substrates.

    - Bedrock
    - Boulder (any rock larger than 10 inches in diameter)
    - Cobble (2.5-10 inches)
    - Gravel (0.1-2 inches)
    - Sand (smaller than 0.1 inch)
    - Silt
    - Other (includes organic debris such as logs, sticks, and leaves)

11. **Embeddedness** Embeddedness describes how much of the surface area of large materials (boulders, cobbles, and gravel) is covered by sediment. Embeddedness indicates how suitable the stream substrate is for benthic macroinvertebrate habitat and for fish spawning and egg incubation.

Observe the stream bottom of the 200-foot site, with little regard for the very edges of the stream. Estimate the percentage of stream bottom which is covered by silt. Select the description that best describes your estimate.

**12. Stream Discharge.** Discharge is a measurement of the amount, or volume, of water flowing past a point.

To calculate stream discharge, multiply the average stream depth (feet) by stream width (feet) by average velocity (feet/second), using the formula on the data sheet. Record the result in units of cubic feet per second ($feet^3$/second).

To obtain these measurements:

a) Within the 200-foot study reach, find a 10-foot stretch of stream with a relatively smooth bottom where the water flows uniformly. (A run works best.)
b) Measure the stream width with a tape measure or a string marked in tenths of a foot. Either tie the string across the stream, or place sticks on opposite banks to indicate the points between which the width was measured. (Estimates of stream discharge will be measured from this line.)

   Be sure to indicate on your site sketch where the width measurement was taken. If a stream is too deep or wide to measure directly, estimate by measuring from the bridge, but indicate this information on the data sheet.
c) Measure stream depth along the line representing stream width at three evenly spaced spots. Add the three depth values and divide by three to determine the average depth in feet.
d) Calculate velocity**:**
   1. Mark off a spot five feet upstream and another spot five feet downstream from the first spot where stream depth was measured.
   2. Measure the time it takes an orange or a perforated velocity sphere to float the 10-foot distance from the upstream spot to the downstream one.
   3. Record the time in seconds in the appropriate space on the Habitat Survey Sheet.
   4. Determine the water velocity in feet per second by dividing 10 feet by the time measured (in seconds). For example: if it took an orange 23 seconds to travel from your partner to you, divide 10 feet by 23 seconds, which is 0.43 feet per second.
   5. Repeat steps 2-4 for the two remaining spots in the stream.
e) Add the three velocities and divide by three to determine the average velocity in feet per second.
f) Calculate estimated stream discharge.

**13. Watershed Features.** Record all land uses in the watershed area upstream and on either side of the study reach as far as you can see. Indicate which land uses are dominant (D) and which affect only small areas (X).

Also note the presence and approximate distance of dams, sewage treatment plants, pig farms, etc. upstream from your study reach.

**14. Channel Alteration.** Indicate whether or not the stream segment has been channelized, or straightened. If the site does show channelization, estimate the portion of the 200-foot section that has been affected.

**15. Notes.** Enter here any characteristics that you feel are important to the quality of the stream and its environs.

## BIOLOGICAL SURVEY

At the study site, you will sample for macroinvertebrates in the same 200-foot section of the stream that was used for the habitat survey.

You will need:
- Dip net
- Bucket (3- or 5-gallon)
- Forceps
- Biological Survey Data sheet
- Wash bottle.

More specifically, you will sample from two different habitats within the study site that contain the highest diversity of macroinvertebrates. These habitats are listed in Table 1 in order of highest diversity to lowest diversity.

Observe the study site prior to sampling to identify the best sampling habitats. The type of habitats you sample will depend upon the characteristics of the particular stream segment you are monitoring.

For example, if you have a rocky bottom reach, a riffle area with various leaf packs would offer the best collecting habitat. If the stream segment has a soft bottom reach, a fallen tree that offers built-up debris (a snag area) and undercut banks may be the best places to collect.

**Table 1.**

| | |
|---|---|
| **Most Diverse Habitat** | **Riffles** |
| ⇧ | **Snag areas, submerged logs, tree roots** |
| ⇩ | **Undercut banks** |
| **Least Diverse Habitat** | **Sediments** |

***Sampling Procedures***
***Riffles***

**1.** Have one member of the team walk down the center of the riffle. Compare all of the areas in the riffle in terms of speed of water flow and size of rocks.

Select two areas in the riffle from which to sample – one with the greatest flow speed and the largest rocks (up to 14 inches in diameter) and the other with the slowest flow speed and the smallest rocks.

Collecting samples from both a fast riffle and a slow riffle constitute one riffle sample.

Sample the riffle area that is positioned farthest downstream first. Follow steps 2-6 below for the first riffle area, and then repeat the procedures for the remaining area.

Note: If you cannot differentiate between fast and slow riffles, sample from the downstream edge of the riffle first, then from the upstream edge.

**2**. Fill a plastic 3-gallon bucket approximately one-third full with clean stream water. Fill the wash bottle with clean stream water.

**3**. Position one volunteer with a dip net on the downstream edge of the riffle. Place the bottom of the net flush on the stream bottom, with the net handle perpendicular to the current of the stream. A second volunteer should pick up large rocks within a 1 foot by 1 foot area directly in front of the net and rub gently to remove any clinging organisms into the net. Place these rocks in the bucket.

**4.** With the first volunteer ("netter") still holding the dip net in the riffle, the second volunteer ("kicker") approaches the netter from approximately one foot upstream and "kicks" with his or her toes so as to disturb the substrate to a depth of about two inches.

As the kicker approaches, the netter sweeps the net in an upward fashion to collect the organisms. This procedure should only take about one or two minutes.

**5.** Carry the net and bucket to the shoreline. Wash the net out in the bucket and pick off those organisms clinging to the edges of the net and place them in the bucket.

**6.** With your hands, clean the entire surfaces of rocks, leaves and twigs in the bucket to remove any clinging macroinvertebrates. Make sure to check each item for remaining organisms before going on to the next item. Once an item has been cleaned thoroughly and checked for remaining organisms, set it aside.

**Do not toss rocks into the stream.** You may disturb the area and upset further sampling. Simply place the rock in the water on the edge of the stream, or place all rocks collected on the shore until sampling is completed.

***Sampling procedures***
***Leaf packs***

Look for leaf packs that are about four to six months old. These old leaf packs are dark brown and slightly decomposed. A handful of leaves is all you need.

1. Position the dip net on the bottom of the stream, immediately downstream from a leaf pack.

2. Gently shake the leaf pack in the water to release some of the organisms, then quickly scoop up the net, capturing both organisms and the leaf pack in the net.

3. Place the macroinvertebrates in the bucket. Before returning leaves and other large objects to the stream, inspect them for organisms.

***Sampling procedures***
***Snag areas, tree roots, and submerged logs***

Snag areas are accumulations of debris caught or "snagged" by logs or boulders lodged in the stream current. Caddisflies, stoneflies, riffle beetles, and midges commonly inhabit these areas.

1. Select an area on the snag, tree roots, or submerged log which is approximately 3 feet by 3 feet in size. This will be the sampling area for these types of habitats.

2. Scrape the surface of the tree roots, logs, or other debris with the net while on the downstream side of the snag. You can also disturb such surfaces by scraping them with your foot or a large stick, or by pulling off some of the bark to get at the organisms hiding underneath. In all cases, be sure that your net is positioned downstream from the snag, so that dislodged material floats toward the net, not away from it.

3. Rinse the net contents with the wash bottle filled with stream water to remove any sediment, and then place organisms in the bucket. Carefully inspect any leaf litter and organic debris which may have been collected for organisms.

4. Spend 15 minutes inspecting the chosen sampling area for any organisms not collected previously. Using your hands or forceps, remove any organisms still clinging to tree roots, logs, or other debris. You may remove a log from the water to better see what may be found, but be sure to put it back.

***Sampling procedures***
***Undercut banks***

Undercut banks are areas where moving water has cut out vertical or nearly vertical banks, just below the surface of the water. In such areas you will find overhanging vegetation and submerged root mats that harbor dragonflies, damselflies, and crayfish.

1. Move the net in a bottom-to-surface motion, jabbing at the bank five times in a row to loosen organisms.

2. Inspect and clean any debris collected and place the collected organisms in the bucket.

***Sampling procedures***
***Sediments***

Areas of mostly sand and/or mud can usually be found on the edges of the stream, where the water flows more slowly.

1. A netter stands downstream of the sediment area with the dip net resting on the bottom. A kicker disturbs the sediment to a depth of about two inches as he or she approaches the net.

2. The netter sweeps the net upward to collect the organisms as the kicker approaches.

3. Wash out the sediment from the net by gently moving the net back and forth in the water of the stream, keeping the opening of the net at least an inch or two above the surface of the water.
.
4. Place the organisms captured by the net in the bucket.

***Subsampling Procedures***

If you have a large sample, counting and identifying the collected organisms is easier if you remove a random subsample of at least 100 organisms. If you have fewer than 100 organisms, there is no need to subsample.

**YOU WILL NEED**

- Biological Survey Data Sheet
- Clip board and pencil or pen
- White, gridded subsampling pan
- Forceps
- Ice water or soda water
- Bucket with collected organisms
- A jar containing alcohol (70% ethanol or isopropyl alcohol) and labels
- Wash bottle filled with stream water
- Calculator

If less than 100 organisms are collected:

1. Transfer the organisms from the bucket to the gridded pan. To do this, pour the bucket's contents through the dip net. Then wash the organisms out of the net into the pan using the wash bottle. Remove any clinging organisms from the net and place them in the pan as well.

2. Place the pan on an even surface, preferably one that you can sit next to. (You can place the pan on an upturned bucket, for example, and sit on another upturned bucket beside it.) The availability of a level surface will vary with the sample site, so use your imagination.

3. Add ice cold water to the pan until it is one inch deep (measure to the first joint of your index finger), or add a couple capfuls of soda water to the pan.

4. Remove all crayfish, mussels, or clams – *do not place them in alcohol*. Indicate in the Macroinvertebrates of Special Interest section of the Biological Survey Sheet that you collected them. If you know their scientific or common names, write them in the space provided, then release the crayfish, mussels and clams back to the stream.

5. Place all macroinvertebrates in the labeled sample jar containing alcohol.

If more than 100 organisms are collected:

1. Transfer the organisms from the bucket to the gridded pan. To do this, pour the bucket's contents through the dip net. Then wash the organisms out of the net into the pan using the wash bottle. Remove any clinging organisms from the net and place them in the pan as well.

2. Place the pan on an even surface, preferably one that you can sit next to. (You can place the pan on an upturned bucket and sit on another upturned bucket beside it.) The availability of a level surface will vary with the sample site, so use your imagination.

3. Add ice cold water to the pan until it is one inch deep (measure to the first joint of your index finger), or add two capfuls of soda water to the pan.

4. Remove any crayfish, freshwater mussels, zebra mussels, or Asiatic clams and indicate that you found these. Place the rest of the organisms in the labeled sample jar. Continue until all organisms have been removed from the selected square. Record on the Biological Survey Sheet the total number of organisms picked. Release all crayfish, mussels and clams back to the stream.

5. Gently rock the subsampling pan to evenly distribute organisms across the bottom. Try to avoid "clumps" of organisms in the corners of the pan.

6. Collect all large organisms that may be scurrying about and place them in a jar of alcohol. In the NOTES section, indicate how many large organisms you remove.

7. Select a numbered square and begin removing organisms lying within that square, counting them as they are removed.

Any organism that straddles a line separating two squares is considered to be in the square that contains its head. In the case of organisms whose head is impossible to locate (such as worms), consider the organism to be in the square that contains the largest portion of its body.

8. Select a second numbered square and remove and count the organisms within it, using the above procedures. Clear as many squares as are needed to provide at least 100 organisms. Record the square numbers and the number of organisms picked from each on the data sheet, as you did for the first square. After removing 100 organisms, continue to remove organisms from within the last square until it is empty.

9. Look through the organisms remaining in the pan for any type of organism that was not collected as part of the subsample.

You should collect only one organism of each uncollected type you find. If you find any additional types, indicate in the Subsampling Procedure section of the Biological Survey Sheet which organisms were collected after Step 5 of the subsampling was completed. If you are not sure what type of organisms they are, at least indicate how many types were collected after subsampling.

10. Discard any organisms remaining in the pan by draining the contents of the pan through the net onto the ground. Place the discarded organisms in another large container containing stream water. Now return these organisms to the stream.

11. Now estimate the total number of organisms collected by using the equations on the data sheet. Let's say you picked organisms from four squares on the tray to obtain the 100 organisms needed for your subsample.

The density per square is calculated like this:

| |
|---|
| Organisms divided by 4 squares<br>equals 25 organisms per square |

12. To find the density of the whole sample, the number of organisms per square is multiplied by the number of squares in the tray. For example, if the above sample tray had nine squares, its projected organism density per sample would equal:

| |
|---|
| Organisms per square multiplied by 9 squares<br>equals 225 organisms per tray. |

This number is an estimate of the total number of organisms that you collected.

## MACROINVERTEBRATE IDENTIFICATION

All of the macroinvertebrates that you collected will be identified to the appropriate taxonomic level such as family or order. This should be done in a laboratory setting.

Information on the Biological Survey Data Sheet will be used to calculate various *metrics* that assess stream integrity. These metrics are defined below.

**Taxa richness** measures the abundance of different types of organisms as determined by the total number of taxa represented in a sample. Generally, taxa richness increases as water quality, habitat diversity, and habitat suitability increase. However, some pristine headwater streams naturally harbor few taxa, while the number of taxa can actually increase in polluted streams.

**Sample density** estimates the total number of organisms collected from your stream site after subsampling. If you did not subsample, your sample represents the total number of organisms collected. If you did subsample, you estimated a sample density before, but the number of subsampled organisms is needed to calculate the Macroinvertebrate Biotic Index.

Nutrient-enriched water has a high density of organisms, while water polluted with toxic chemicals or silt or sand usually has a lower density.

The **Macroinvertebrate Biotic Index** score (MBI) and the **percent composition** of taxa in a stream determine the presence or absence of taxa which have a high pollution tolerance. MBI values reflect stream quality as follows:

1. Less than 6.0 = good water quality
2. 6.0 to 7.5 = fair water quality
3. 7.6 to 8.9 = poor water quality
4. Greater than or equal to 9.0 = very poor water quality

The percent composition (%C) of macroinvertebrate taxa also reflects stream quality. Streams with high percentages of mayflies and stoneflies are considered to be in good health. Those that harbor a high percentage of midge larvae and aquatic worms are considered to be in poor health, since these organisms are tolerant to some types of pollution that reduce dissolved oxygen levels.

**YOU WILL NEED**

- Biological Survey Data Sheet
- Stereoscope, or dissecting microscope
- Pencil or pen
- Petri dishes
- Macroinvertebrate sample
- Forceps
- Macroinvertebrate Key (or aquatic insect identification key)
- Bottle of alcohol
- Calculator
- Extra jars

***Biological Survey Data Sheet***

***Identify the Organisms***

The data sheet provides boxes with common names of macroinvertebrate indicator taxa found in Illinois streams. It is in these boxes that you record the number of organisms collected within each taxon. It is not expected that you will have found organisms from each taxon listed on the data sheet. Mark only those taxa identified from the sample.

The taxa list is not inclusive; only indicator organisms used to assess stream quality are included. If other macroinvertebrates are collected, write their names and how many were collected in the section labeled "NOTE." To identify organisms by taxa, first separate them by general appearance, then identify the taxa to which they belong with the help of an identification key. Appendix C contains a simple key.

Write the number of organisms identified from each taxon in the column marked "No. of Organisms (N)."

**Label the collection**

Once the macroinvertebrates have been identified and counted, place them in a properly labeled container. The label should be written in permanent, non-alcohol soluble ink (pens can be purchased from a biological supplier or art supply stores), and taped to the outside of the jar.

All labels should contain the following information:

Date, Stream Name, County, Location, Name of Identifier

An example label is given below:

| |
|---|
| July 5, 2007<br>Kerton Creek Fulton Co.<br>0.5 mi. West of SR 100 on CR 1200 E<br>M. Smith |

**Calculate the Biotic Indices**

Calculate the values which will measure your site's biological integrity. To do this:

**1**. Multiply the number of organisms identified from each taxon by its tolerance rating. The "Tolerance Rating ($T_i$)" is printed on the data sheet in the column next to "No. of Organisms (N)." Enter the resulting number in the last column titled "Tolerance Value ($T_v$)."

**2**. Add the numbers in each column and place the results in the corresponding boxes marked "Totals." You should now have numbers representing the total number of taxa ("$\sum$Taxa"), the total number of organisms ("$\sum$N"), and the total tolerance value ("$\sum$(Tv)"). (The Greek letter $\sum$ sigma is the symbol for "total.")

**To calculate**

"Macroinvertebrate Biotic Index" is the total tolerance value divided by the total number of organisms – MBI = $\sum(T_v) \div \sum N$

"Taxa Richness" is the total number of taxa that you identified -- $\sum$ Taxa

"Sample Density" is the total number of indicator organisms collected or subsampled --$\sum N$.

"Percent Composition" reflects which organisms were most prominent in the stream.

Enter in column "(N)" the number of organisms collected from each taxon listed.

Divide the "No. of Organisms (N)" in each taxon by its community density ("$\sum N$") and multiply by 100 to obtain the percent composition - $\%C = (N) \div \sum N \times 100$

Add the "% C" of each taxon to obtain a subtotal percentage ("% subtotal").

Subtract "% subtotal" from 100% to obtain the percentage of other organisms in your sample.

**FINISHING UP**

**Wrapping Up Your Monitoring Session**

- **Follow Up with Landowner/Property Manager**

If you or your group monitored a site owned or managed by someone else, it is strongly recommended that a thank-you note be sent once your monitoring is complete. You may also like to show a copy of your data sheets and a summary of your results. This will help ensure a willingness on the part of the landowner or property manager to allow the site to be monitored in future years.

## APPENDIX A
## FACTORS THAT AFFECT STREAM QUALITY IN ILLINOIS

### Pollutants

Pollutants are unwanted materials ranging from litter to industrial waste. Stream pollution in particular comes from a variety of sources and has many complex effects. Benthic macroinvertebrate communities for example can be affected by pollutants such as sediment, organic wastes, excess nutrients such as phosphates from detergents, and toxic substances.

Several types of pollutants affect Illinois rivers and streams. They include the following sources.

**Sediment** from soil erosion has long been considered the most serious threat to water quality in Illinois. Farmfields, mines, cut-over forests, and unpaved roads are sources of sediment in streams in rural areas. In urban areas, ill-managed construction sites can greatly elevate sediment levels in streams.

Excessive amounts of sediment in the water can destroy macroinvertebrate habitats by filling the spaces between boulders and rocks in which many of these organisms live. Sediment can also harm the filter-feeding mechanisms of some aquatic organisms, clog the gills of others, or bury macroinvertebrates entirely.

**Organic wastes** originate from industrial operations such as pulp mills, sugar refineries and some food processing plants. The most common source of organic wastes in Illinois, however, is the discharge from municipal sewage treatment plants. When organic wastes enter a stream, they are decomposed by bacteria in the sediments and water. These bacteria consume the oxygen dissolved in the water. The amount of oxygen needed to decompose a given amount of organic waste in a stream is called its biological oxygen demand, or BOD. The decomposition of an organic waste in a stream that has a high BOD leaves very little dissolved oxygen for the fishes, aquatic insects, and other organisms that live in the stream.

**Nutrient enrichment** refers to the addition of nitrogen and/or phosphorous to an aquatic ecosystem. Wastewater from sewage treatment plants, fertilizers from agricultural runoff, and urban runoff add nitrogen and phosphorous to streams. Other sources of nutrient enrichment include septic tank leakages and farm animal wastes.

Nutrients occur naturally in stream water. But because nitrogen and phosphorous are key elements in the growth of aquatic plant life such as algae, an increase in these nutrients can significantly increase growth by the plants and animals in the stream. Rapid plant growth in streams results in algal blooms. Besides being unsightly, algal blooms can cause water to smell and taste bad. Because algal masses are organic, their decomposition depletes the available oxygen in water like any other organic waste. Nutrient enrichment usually increases the number of macroinvertebrates in a stream at first, but these numbers decline as dissolved oxygen levels decrease.

**Temperature elevation** stresses many species of fishes and macroinvertebratres that have limited tolerances to high temperatures. Two main factors contribute to temperature elevation in Illinois streams. The loss of riparian zones removes shade-providing plants, exposing streams to direct sunlight for many hours. Also, streams receive some part of their water from groundwater sources. This (usually) cooler groundwater helps to cool the warmer surface waters entering streams from

runoff or rainfall. Irrigation and stream channelization cause water tables to drop, decreasing the volume of cooler groundwater entering streams.

**Channelization** converts natural meandering streams with varied habitats to straight-sided ditches of nearly uniform width, depth, current velocity, and substrate. Fewer habitats mean fewer species capable of living in such modified streams. Bankside vegetation is removed when a stream is channelized, further reducing the biodiversity of the stream.

**Toxic chemicals** have helped degrade many stream ecosystems throughout the United States. Truly safe levels of many toxic chemical contaminants have never been determined, and their long-term effects on ecosystems are largely unknown. These chemicals enter streams as a result of irresponsible discharge of industrial wastes, indiscriminate use of agricultural pesticides, and careless dumping of household cleaners. Although toxic chemicals are still getting into Illinois' streams, their concentrations have been reduced to the point where most authorities now consider other pollutants (such as sediment and excess nutrients) more immediate environmental threats.

However, the concentration of toxic chemicals in stream waters is not necessarily a true reflection of their presence in a stream. Plants and animals often absorb these pollutants either from the water or sediment and accumulate them in their tissues. Monitoring only stream waters for toxic chemicals does not reliably assess stream quality, since most such chemicals are concentrated not in the water but in the bodies of the organisms living in the stream and in sediments.

Over time, toxic substances in the tissues of stream organisms may reach levels many times higher than in the stream's water or sediments. When stream organisms that have accumulated toxic chemicals are eaten by other organisms (such as raccoons or fish-eating birds), the toxic chemical is passed along the food chain, leading eventually to humans.

**Point vs. nonpoint source pollution**

Pollution is classified according to its source. Point source pollution comes from a single identifiable point such as a factory discharge pipe that empties into a river. Nonpoint source pollution does not come from a clearly defined source. Nonpoint source pollution is primarily runoff from land that contains pesticides, fertilizers, metals, manure, road salt, and other pollutants. Nonpoint source pollution originates on farms, lawns, paved streets and parking lots, construction sites, timber harvesting operations, landfills, and home septic systems. "Acid rain" is another nonpoint pollutant.

Nonpoint source pollution is a major factor in the deterioration of Illinois' streams. It occurs wherever and whenever soils cannot sufficiently absorb and filter pollutants contained in storm water drainage and runoff. Nonpoint source pollution can quickly kill a stream by introducing organic and inorganic pollutants that silt streambeds, decrease dissolved oxygen, and poison aquatic organisms.

**APPENDIX B**
**THE LIFE HISTORY OF MACROINVERTEBRATES**

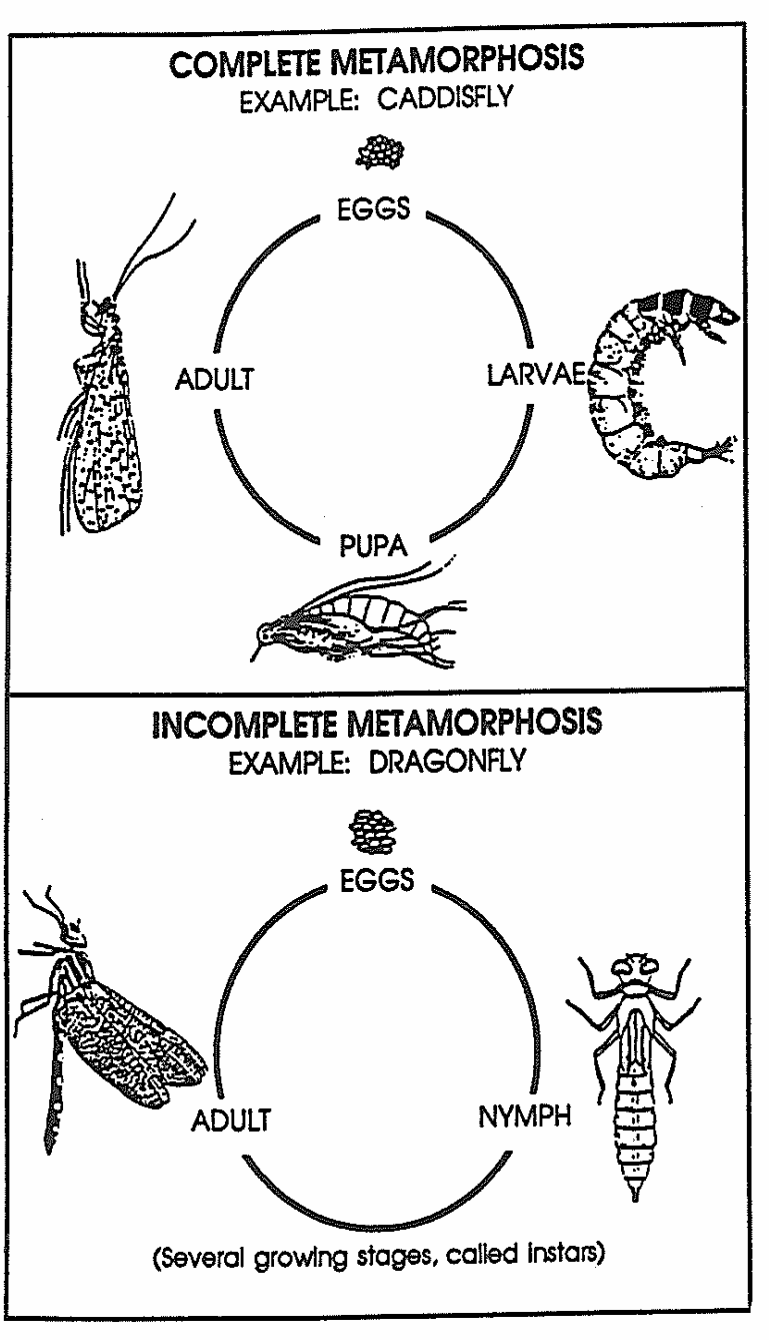
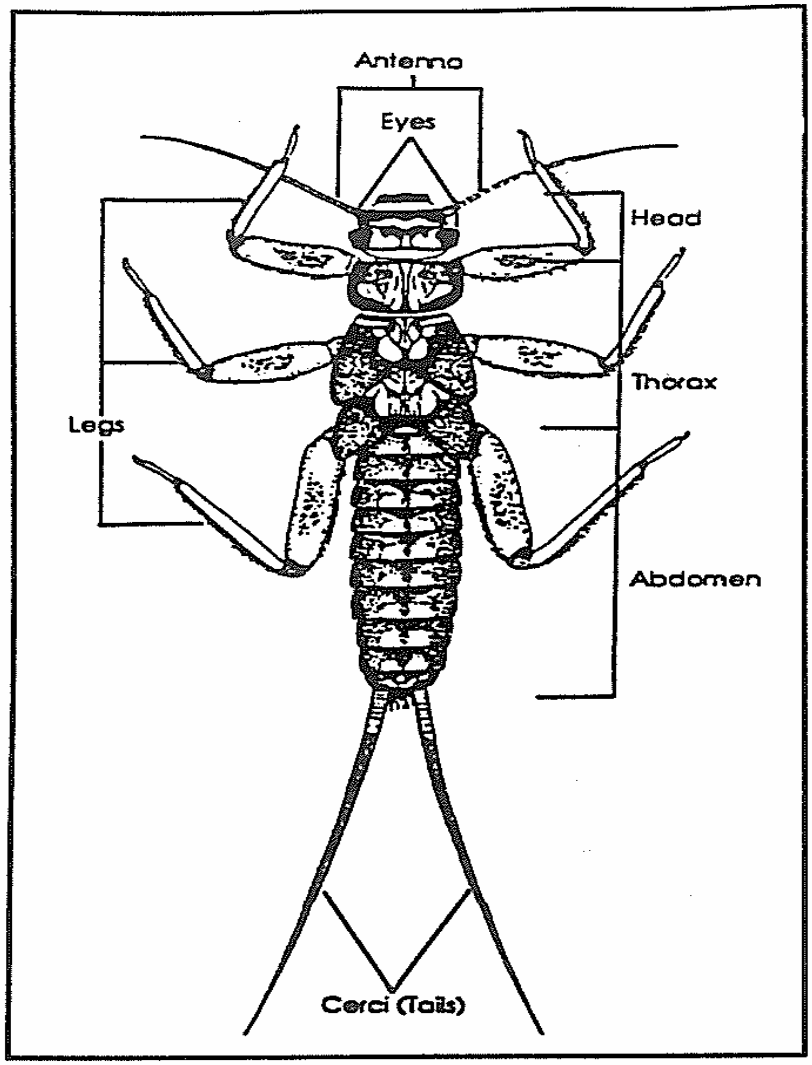



*Figure 2. Insect Life Cycles*

## Aquatic Insects

The aquatic insects comprise the bulk of benthic macroinvertebrate communities in healthy, freshwater streams. These insects are mostly in their immature form and live their adult life on land, sometimes for only a few hours. Most aquatic insects can be divided into two separate groups: ones that develop through complete metamorphosis, and ones that develop through incomplete metamorphosis.

Metamorphosis is the change that occurs during the organism's development from egg to adult (see Figure 2). Some aquatic insects develop through complete metamorphosis, which consists of four stages. These immature insects are called larvae and they do not resemble the adults and, in fact, may look grossly different. During the pupae stage, the organisms inhabit a "cocoon-like" structure where the transformation from larva to adult occurs. Incomplete metamorphosis has three main stages of development (except for the mayfly which has two winged growing stages). These immature insects are called nymphs, and they undergo a series of molts until the last decisive molt transforms the organism into an adult or imago. There is no intermediate pupae stage where transformation occurs. The nymphs resemble the adults closely except for wing development.

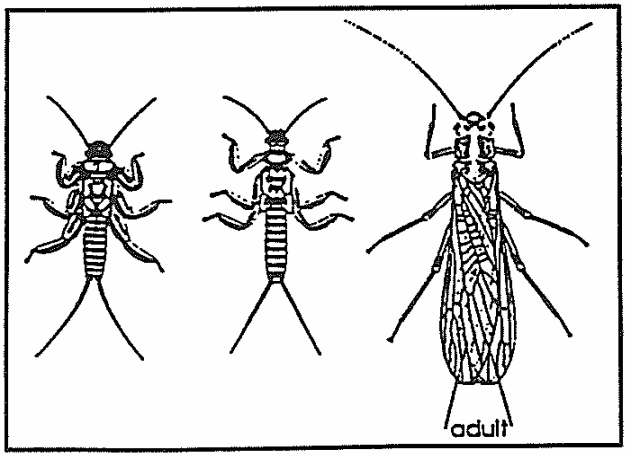


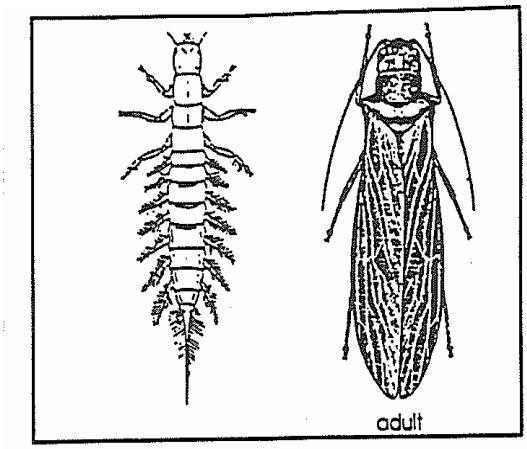

All insects (whether they are adult or immature or whether they develop through complete or incomplete metamorphosis) have three main body parts: head, thorax, and abdomen (Figure 3).

*Figure 3. Aquatic Insect Body Parts: Main parts consistent in all aquatic insects*

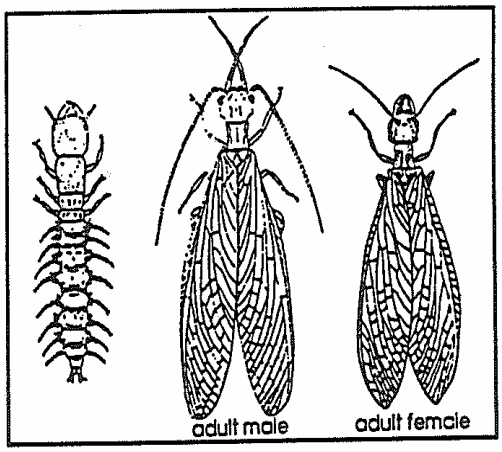
## Aquatic Insects

*Stoneflies*
*Metamorphosis:* incomplete
*Nymphs*: possess two distinct "tails" called cerci, which are actually sensory feelers; brightly colored in tan, brown, gold and black; length varies, up to 1 inch
*Reproduction*: females deposit eggs on top of water where they drift down to the bottom
*Adults:* resemble nymphs, but possess a long pair of wings folded down the length of the body
*Food*: some are carnivorous, others feed on algae, bacteria, and vegetable debris; eaten by a variety of fish species

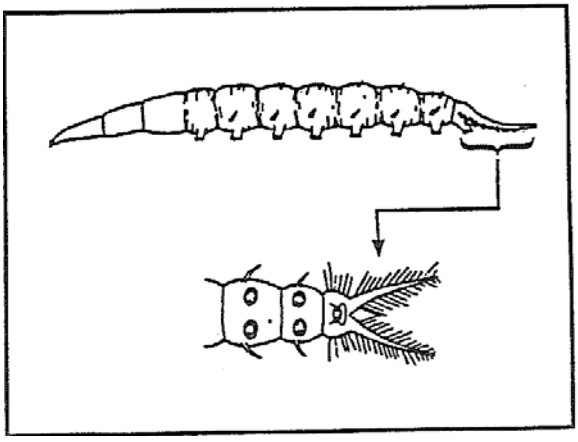




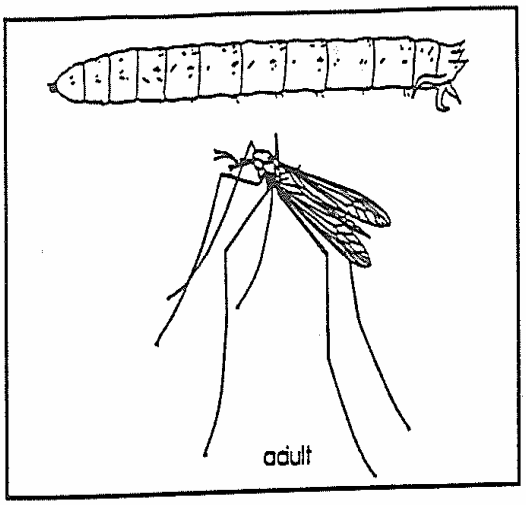

*Alderflies*
*Metamorphosis:* complete
*Larvae*: possess a single tail filament with distinct hairs; body is thick-skinned with 6 to 8 filaments on each side of the abdomen; gills are located near the base of each filament; color brownish
*Reproduction*: female deposits eggs on vegetation that overhangs water, larvae hatch and fall directly into water
*Adults:* dark with long wings folded back over the body
*Food*: larvae are aggressive predators, feeding on other aquatic macroinvertebrates; as secondary consumers, they are eaten by other larger predators



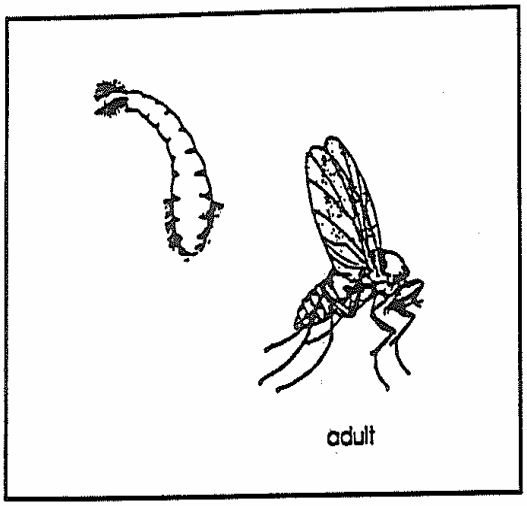

*Dobsonflies*
*Metamorphosis:* complete
*Larvae*: often called hellgrammites, possess two large mandibles; several filaments are located along the sides of the abdomen; one pair of short tail filaments used for grasping: color brown to black with a large dark "plate" behind base of head; six legs; length up to 3 inches
*Reproduction*: female attaches eggs on overhanging vegetation; when eggs hatch, the larvae fall directly into the water
*Adults*: possess two pairs of extremely long, colorful wings folded back the length of the body; males possess a pair of long mandibles that can cross that are used to grasp the female during copulation; females possess one pair of mandibles smaller than those of the male
*Food*: predaceous larvae feed upon other aquatic macroinvertebrates; larvae widely used as fish bait; important food source for larger game fish



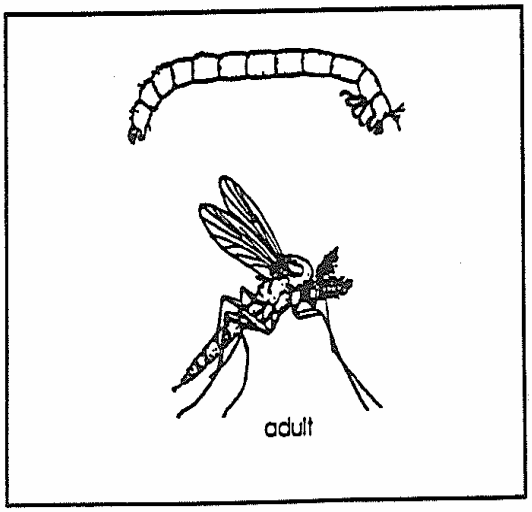
*Snipe Flies*
*Metamorphosis:* complete
*Larvae*: elongated, cylindrical, slightly flattened; cone-shaped abdomen is characteristic; two, long, fringed filaments at end of abdomen; color varies; length up to ½ inch
*Reproduction*: female deposits eggs on overhanging vegetation and immediately dies and remains attached to egg mass; larvae hatch and drop into water
*Adults*: a moderately sized fly that is usually found around low bushes, shrubbery, and tall grasses
*Food*: larvae are predaceous, adults mostly feed on blood




*Crane Flies*
*Metamorphosis:* complete
*Larvae*: definitely "worm-like," thick-skinned, and brownish-green to somewhat transparent or whitish; pointed or rounded at one end and a set of disk-like spiracles at the other; color may be stained greenish or brownish; length up to 3 inches
*Reproduction*: female deposits eggs on submerged vegetation or other debris
*Adults*: best described as "giant mosquitoes;" possess long legs and plump bodies, but are harmless
*Food:* mostly plants and plant debris; some are predaceous

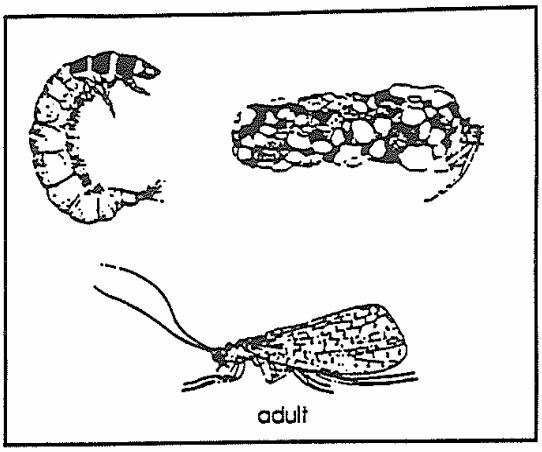



*Black Flies*
*Metamorphosis:* complete
*Larvae*: small, worm-like and bulbous at one end; when out of water, they fold themselves in half while wiggling; color may be green, brown or gray but is usually black; length up to 1/3 inch
*Reproduction*: females deposit eggs on submerged vegetation or other debris
*Adults*: fly-like; known as a serious pest because it inflicts painful bites to warm-blooded animals
*Food:* larvae eat organic debris filtered from water; adult females of many species feed on blood

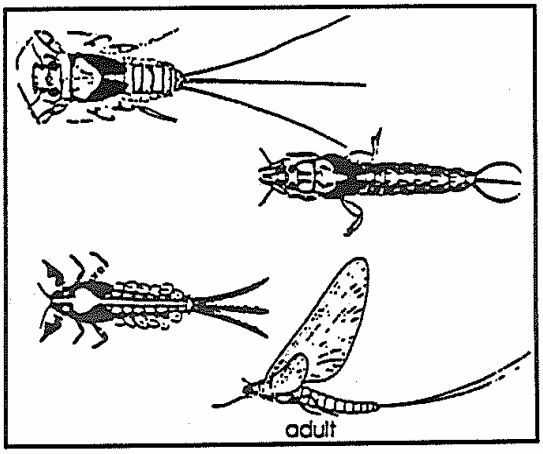



*Midges (flies)*
*Metamorphosis:* complete
*Larvae*: most species extremely small and thin; worm-like and wiggle intensely when out of water; color varies from gold, brown, green, and tan to black; length is usually less than ½ inch
*Reproduction*: female deposits a gelatinous mass of eggs on the water surface or attaches it to submerged vegetation
*Adults*: resemble small mosquitoes with fuzzy antennae on males
*Food:* primarily algae and other organic debris; many feed on other insect larvae

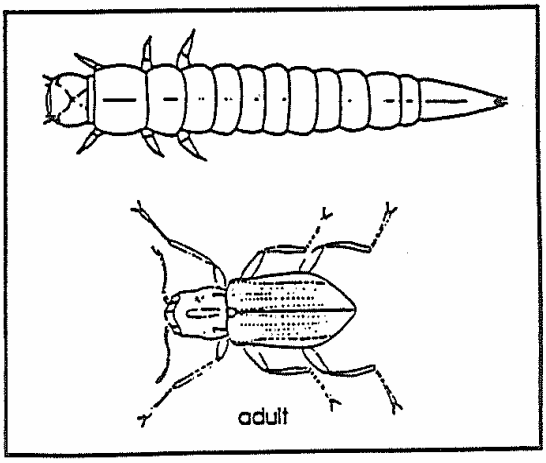
*Caddisflies*
*Metamorphosis:* complete
*Larvae*: worm-like, soft bodies; head contains a hard covering; color can vary from yellow to brown, but usually green; larvae are known for their construction of hollow cases that they either carry with them or attach to rocks; cases are built from sand, twigs, small stones, crushed shells, rolled leaves, and bark pieces; cases used for protection and pupation; length up to 1 inch
*Reproduction*: eggs encased in a gelatinous mass and are attached to submerged vegetation or logs
*Adults*: moth-like, brownish and usually nocturnal; wings thickly covered with hairs
*Food:* larvae feed on algae, small bits of plant material, and animals; some species build nets to catch drifting food; fed upon by several species of fishes

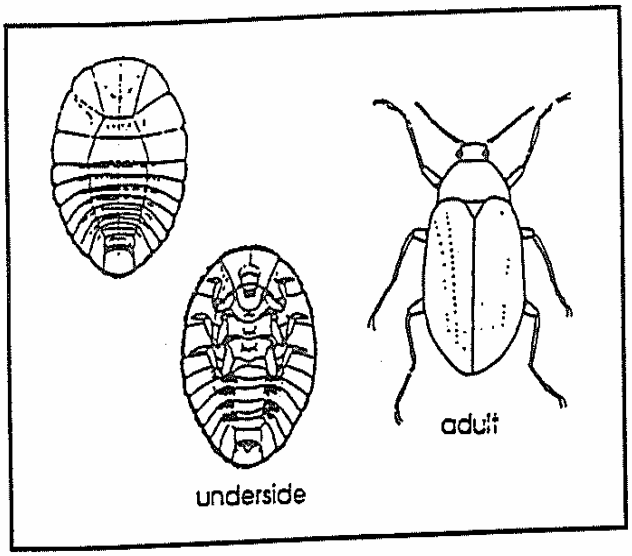



*Mayflies*
*Metamorphosis:* incomplete
*Nymphs*: three distinct cerci (tails), occasionally two; cerci may be fuzzy or thread-like, but never paddle or fan-like; color varies from green to brown to gray, but is usually black; total length up to 1 inch
*Reproduction*: female deposits eggs on top of water where they drift to the bottom; some species crawl under water and attach eggs to submerged objects
*Adults*: resemble nymphs, but usually possess two pairs of long, lacy wings folded upright; adults usually have only two cerci
*Food*: consists of small plant and animal debris, such as algae, diatoms, and plankton; preyed upon by fishes and play an important role in the food chain

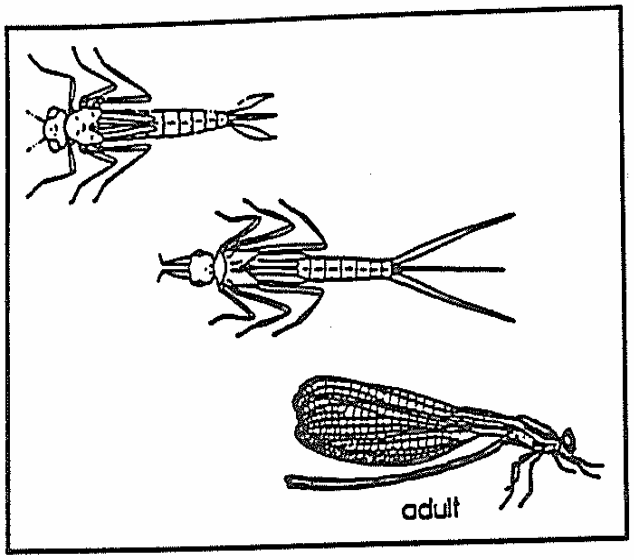



*Riffle Beetles*
*Metamorphosis:* complete
*Larvae*: resemble small "torpedoes" with circular stripes or rings around body; pointed at both ends with a "fuzzy" mass at one end; color usually grayish; length less than ½ inch
*Reproduction*: females deposit eggs on plant materials under water
*Adults*: unique in that they are aquatic and are found more often than the larvae; adults are beetle-like, tiny, and usually black
*Food*: primarily plant material such as diatoms and algae

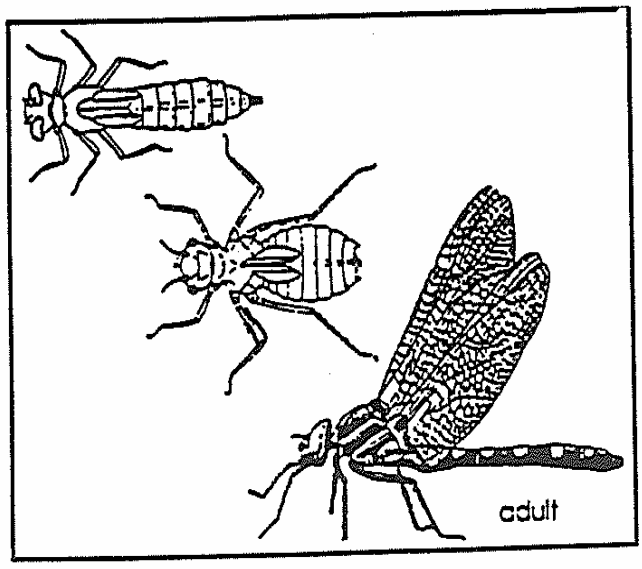




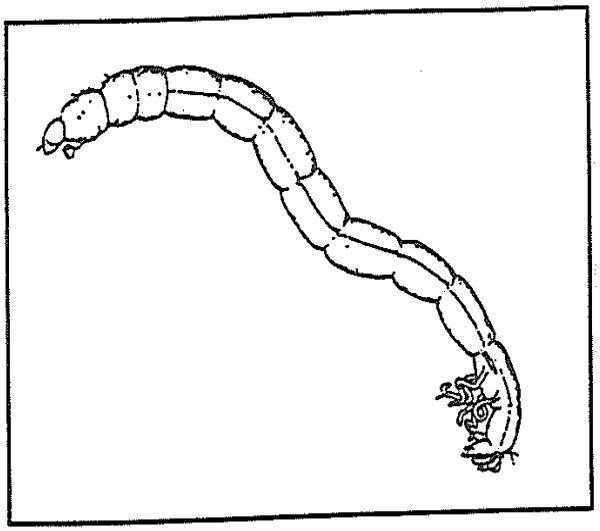

*Water Penny Beetle*
*Metamorphosis:* complete
*Larvae*: resemble circular incrustations on rocks; sucker-like; color green, black, tan or brown; length usually no more than ½ inch
*Reproduction*: adult females crawl into water and deposit eggs on undersides of stones
*Adults*: typical beetle-shaped body; resemble an extremely large riffle beetle (not truly aquatic; can be found on emergent rocks in riffles)
*Food:* primarily plant debris such as algae and diatoms




*Damselflies*
*Metamorphosis:* incomplete
*Nymphs*: bodies elongated with three distinct paddle-like tails (actually gills) located at the end of abdomen; six legs positioned near front of body; two large eyes on top of head; colors range from green to brown and black; some are robust, others slender; length up to 2 inches
*Reproduction*: females deposit eggs on top of water where they drift to the bottom
*Adults*: possess extremely long abdomens; two pairs of wings that are held upright at rest; very colorful in greens, blues, and reds
*Food:* predaceous, nymphs feed on other aquatic macroinvertebrates

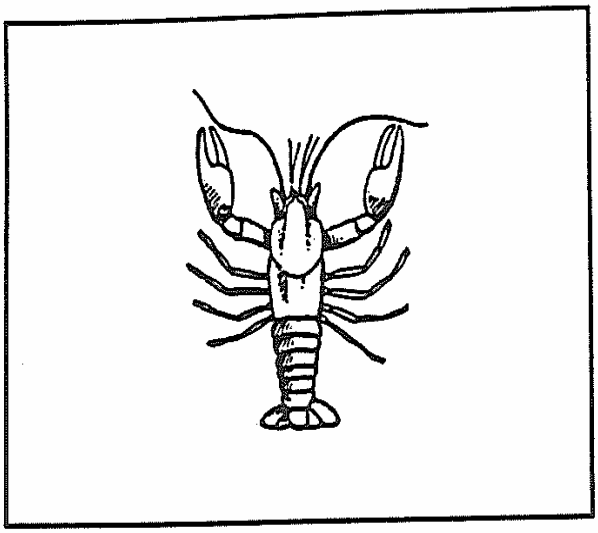



*Dragonflies*
*Metamorphosis:* incomplete
*Nymphs*: vary in shape, but most have robust, elongated, or "spider-like" bodies, often with algae growing on their back; six legs at side of body or near front on elongated species; two large eyes at sides of head; a pair of small wings begins to develop on back; color varies from brown and black to green; length up to 2 inches
*Reproduction*: eggs are deposited on surface of water and drift to bottom
*Adults*: similar to adult damselflies, but the two pairs of wings are laid flat or horizontal at rest; some species can attain length of over 4 inches
*Food*: predaceous; nymphs feed upon other aquatic macroinvertebrates, small fishes, and tadpoles

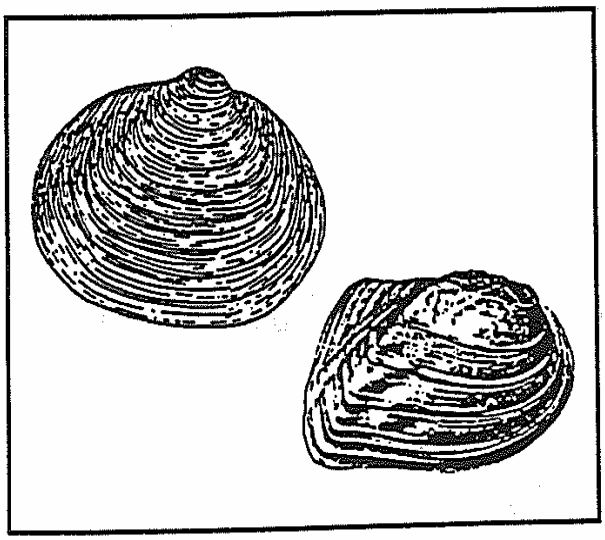


*Blood Worm Midges*
*Metamorphosis:* complete
*Larvae*: similar to other midges, but are larger, robust, and distinctly red in color; length up to 1 inch
*Reproduction*: female deposits gelatinous mass of eggs on the surface of water or on submerged vegetation.
*Adults*: resemble small mosquitoes with fuzzy antennae on males
*Food*: primarily algae and other organic debris

## Other Aquatic Macroinvertebrates

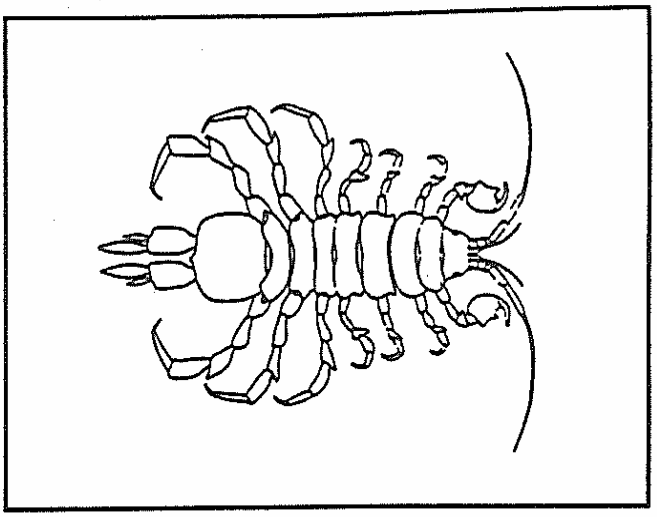


*Crayfishes*
*Description:* resemble miniature "lobsters;" possess four pairs of walking legs and a pair of strong pinchers; color can be brown, green, reddish, or black; length up to 6 inches
*Reproduction*: females carry eggs in a mass underneath their tail; mass resembles a large "raspberry"
*Food*: omnivorous, eating plants and animals; pinchers are used for tearing food into edible chunks; crayfish are preyed upon by larger game fishes

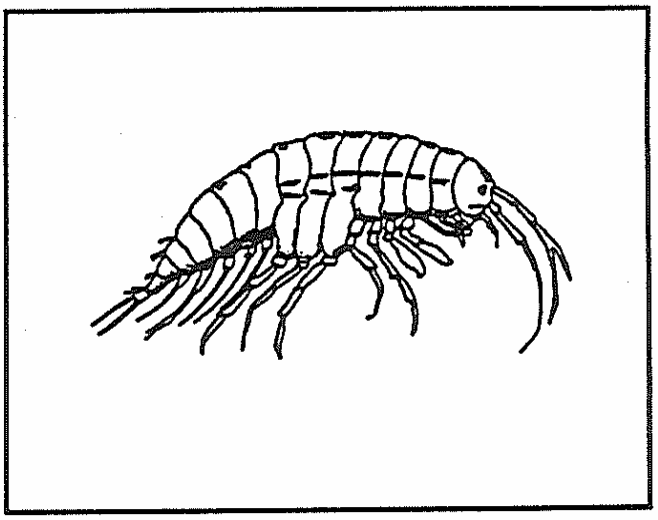


*Freshwater Clams and Mussels*
*Description*: include the small fingernail clams, European clam (Corbicula), and the larger pearly naiad mussels; fingernail clams are small (no more than ½ inch in diameter), fragile, and are whitish or grayish in color; Corbicula can be larger, 1 to 2 inches in diameter, light-colored; mussels are large (up to 9 inches in diameter), robust, thick- or thin- shelled, and usually dark in color
*Reproduction*: fingernail clams are self-fertilizing, the young developing inside the water tubes of the adult; the larvae, called glochidia, develop inside the adult female and are released into the water where they eventually attach onto a host fish; they then parasitize the fish for about two weeks until they drop off and develop on the stream bottom into an adult
*Food*: primarily filter feeders; filter organic debris and plankton out of water; preyed upon by numerous fishes and mammals

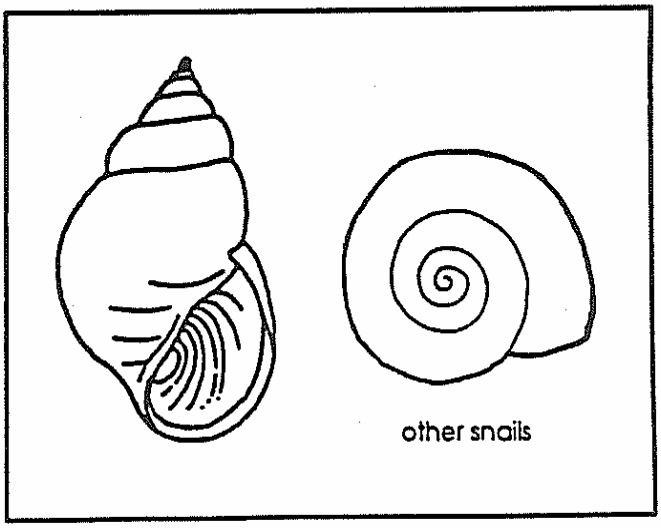
*Sowbugs or Aquatic Pill Bugs*
*Description*: somewhat flattened; resemble their terrestrial cousins; seven pairs of legs; color varies, usually gray, but sometimes brown; length less than 1 inch
*Reproduction*: eggs carried under the female's abdomen until they hatch
*Food*: characterized as scavengers, eating both dead and live plant and animal debris



*Scuds or Sideswimmers*
*Description*: possess extremely flattened sides and a hump back; somewhat resemble large "fleas;" several pairs of legs; color varies from white to brown but usually gray; most are very small, but some can reach ½ inch in length
*Reproduction*: eggs held by the female in a marsupium (sac) until they hatch
*Food*: characterized as scavengers, eating both plant and animal debris; an important food source for a variety of fish species



*Right-handed and other Snails*
*Description*: generally gill-breathing snails; right-handed snails identified by their swirling shell opening on the right-hand side as the point is straight up in the air and the opening faces you; color is black, brown or gray, often covered with algae; length up to 1 inch; other snails have shells resembling ram's horns
*Reproduction*: eggs are laid in gelatinous masses usually attached to rocks or other debris
*Food:* primarily algae that grows on rocks and other debris; occasionally feeds upon decaying plant and animal matter; preyed upon by fishes, turtles, predatory invertebrates, and leeches



# APPENDIX C
# MACROINVERTEBRATE IDENTIFICATION KEY

The following key was adapted from *A Naturalist's Key to Stream Macroinvertebrates for Citizen Monitoring Programs in the Midwest,* by Joyce E. Lathrop (Proceedings of the 1990 Midwest Pollution Control Biologists Meeting, Chicago, Illinois, April 10-13, 1990). It is suggested to use more than one taxonomic key when identifying any organism.

The key is composed of sets of choices. Read each choice carefully and compare the organism to the description. Once you find the description that matches your organism's features, go to the next description indicated. For example, let's say that the figure below is the organism you are trying to identify.

The first set of descriptions read:

1. A. With a hard calcareous shell of one or two valves.
   MOLLUSKS……...2
   Mollusca: Bivalvia (Clams and Mussels), Gastropoda (Snails and Limpets). In general, mollusks are found in hard waters with a pH near or above neutral (pH7).

   B. With a spiral (snail-shaped) case of sand; animal hidden within case; body with 6 jointed legs; small and inconspicuous, often overlooked …….……SNAIL-CASE CADDISFLIES
   Tricoptera: Helicopsychidae (Helicopsyche)
   INTOLERANT

   C. Without a hard, calcareous shell or spiral-shaped sand case; may or may not have non-spiral case of sand, pebbles or plant material ……..…..…7

You would select choice "C" because your organism does not have a hard, calcareous shell or a spiral-shaped sand case. Also, your organism does not have any type of case. Therefore, you would go on to description #7. You continue with your search until you come upon a description which tells you what type of organism you have, and no more additional descriptions are given.

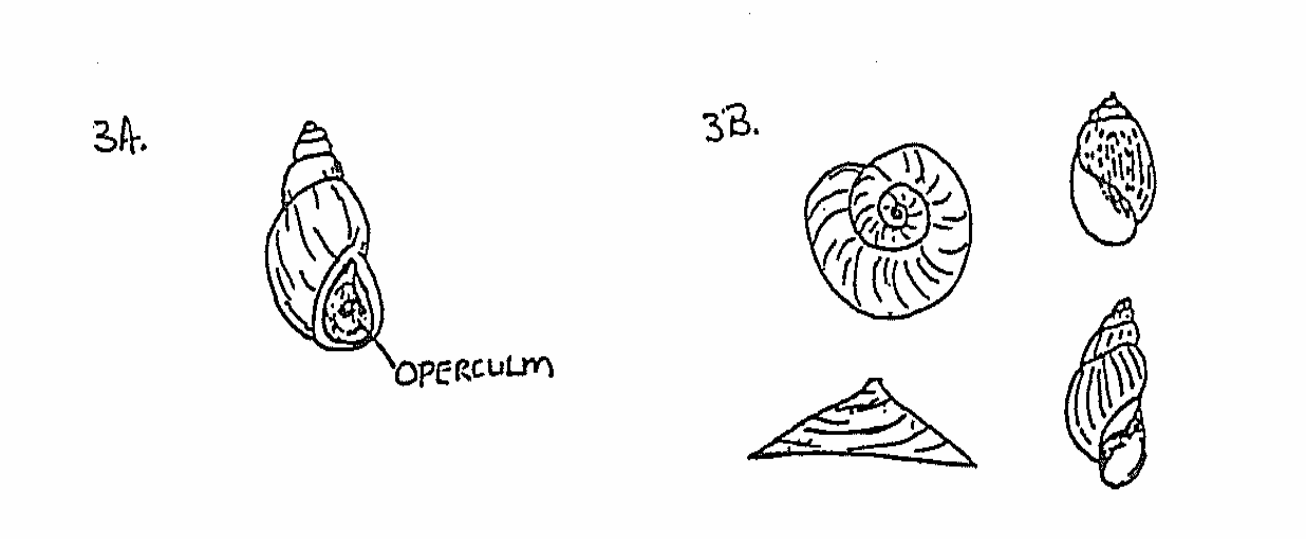
Size range estimates of the organisms are given beneath many of the descriptions. Variations in size ranges are common, however, and all organisms of a species may not be covered by the sizes listed.

Numbers in parentheses next to the description's number (see example) indicate which description was used to reach your present position. This information is provided to help you back track your search in case you made a mistake in the identification of the organism.

**An example of a macroinvertebrate description:**

**Description number**
**↓ Description which was used to reach this point**
**↓ ↓ ↓Description Choice**

3 (2). A. Snails with an operculum (a hard covering used to close the aperture or opening)
……..……....OTHER SNAILS
Gastropoda; Prosobranchia: Six families. (Operculate Snails) **↑**
MODERATELY TOLERANT **←Tolerance** **Final destination for this organism**
**0.3 cm – 4.3 cm ← Size Range**
B. Snails without an operculum; lung-breathing snails (Pulmonata) …….……4
Description choices **↑**
**Go to this description**

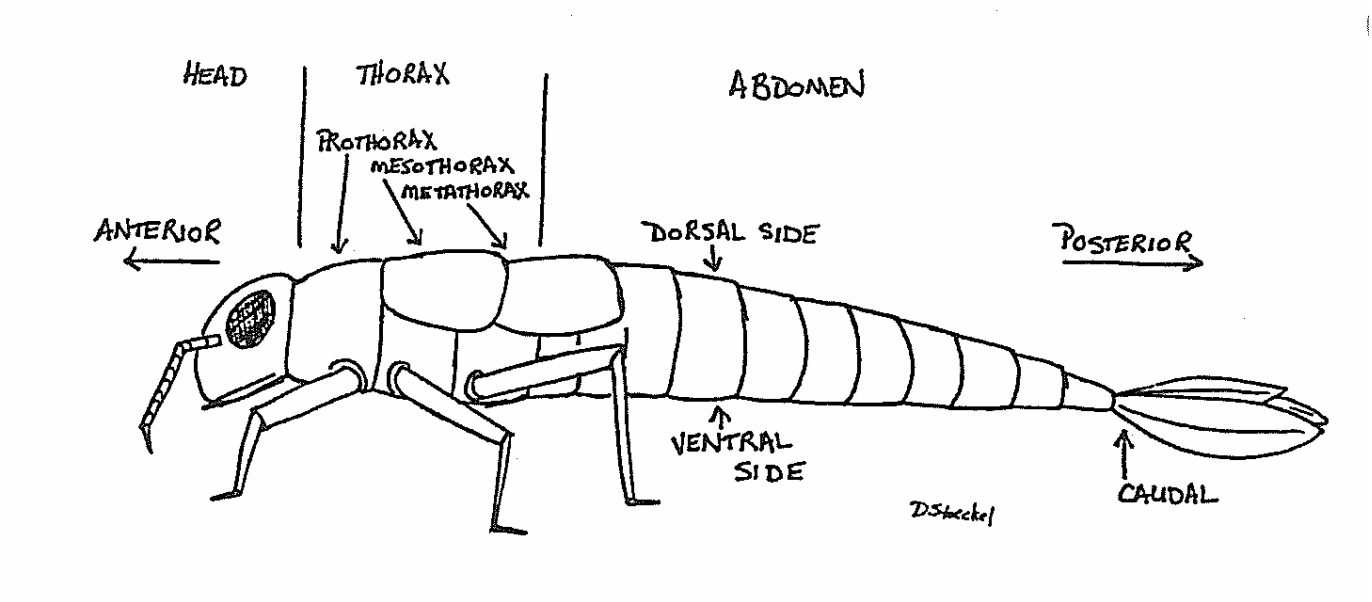


**Basic Insect Morphology**

An insect's body is generally divided into three major sections: the head, the thorax, and the abdomen. The thorax of an insect is separated further into three more sections named the prothorax, mesothorax and metathorax. Wings or wing pads are found on the mesothorax and metathorax. One pair of legs is generally found on each of the thoracic segments. The legs of an insect have parts which are similar to our legs. The first leg segment coming from the body is called the femur. The next leg segment is called the tibia. The feet of an insect are referred to as tarsi. The tarsi are separated further into segments called tarsal segments.

The words below are used in the key. These words indicate where to look on an insect's body for a particular identifying mark.

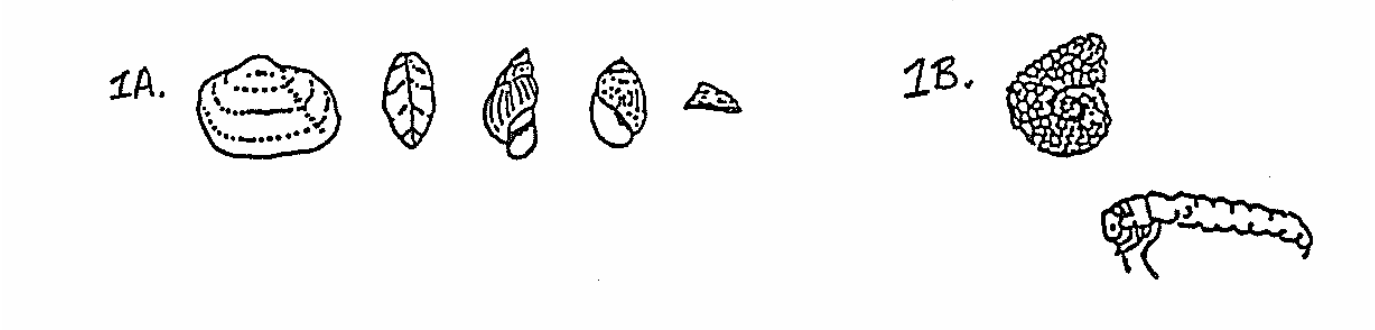
1. Anterior – In the direction of the head
2. Posterior – In the direction of the anus (or end of abdomen)
3. Caudal – Found at the tip of the abdomen
4. Dorsal – Refers to the back, or top of the organism
5. Ventral – Refers to the belly, or bottom of the organism



1A. With a hard calcareous shell of one or two valves
MOLLUSKS …….…….....2
Mollusca: Bivalvia (Clams and Mussels), Gastropoda (Snails and Limpets) In general, mollusks are found in hard waters with a pH near or above neutral (pH 7).

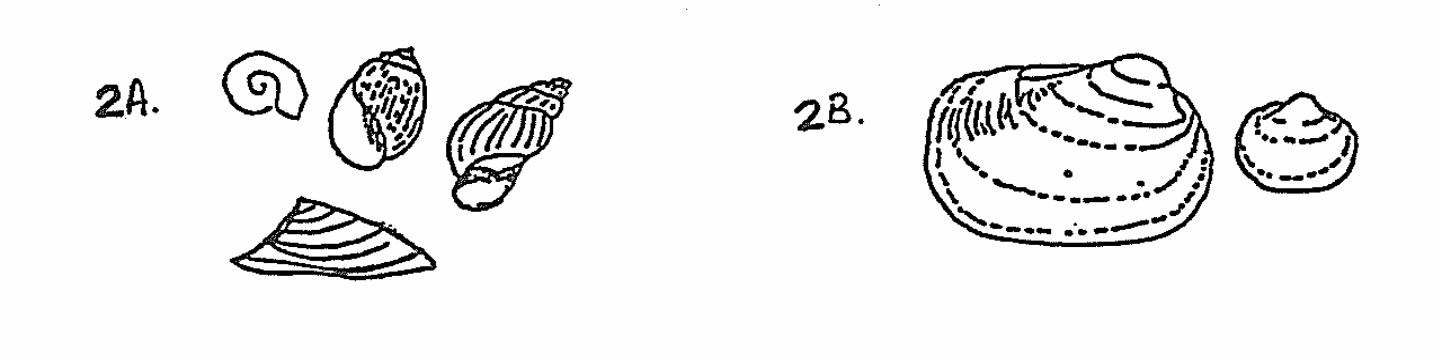
B. With a spiral (snail-shaped) case of sand; animal hidden within case; body with 6 jointed legs; small and inconspicuous, often overlooked……OTHER CADDISFLIES
Tricoptera: Helicopsychidae (*Helicopsyche*) Snail Case Caddisflies.
INTOLERANT
0.5 cm

C. Without a hard, calcareous shell or spiral-shaped sand case; may or may not have a non-spiral case of sand, pebbles or plant material …….……..7



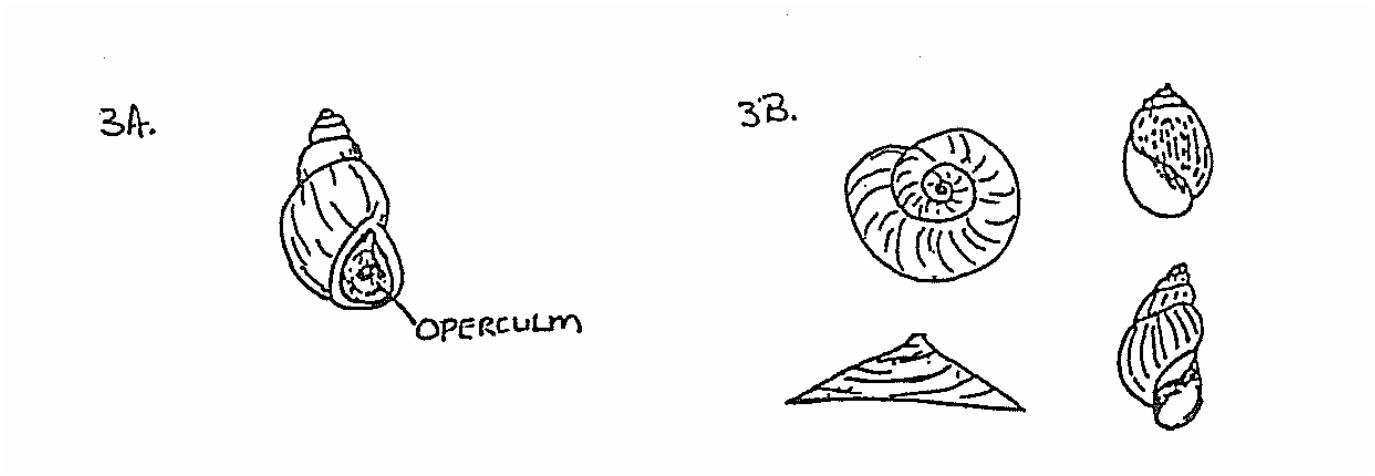

2(1)A. Shell of one valve. SNAILS ……..……3

B. Shell of two valves held together by a non-calcareous ligament.
CLAMS AND MUSSELS……..……6
2.0 cm – 14.0+ cm



3(2)A. Snails with an operculum (a hard covering used to close the aperture or opening) ……..…….OTHER SNAILS
Gastropoda: Prosobranchia Six families (Operculate Snails)
MODERATELY TOLERANT
0.3 cm – 4.4 cm

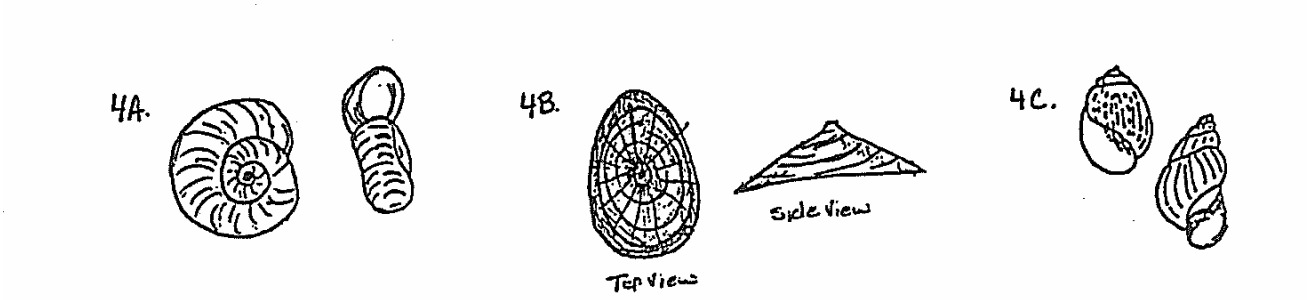
B. Snails without an operculum; lung-breathing snails (Pulmonata) …….4




4(3)A. Shell discoidal (coiled in one plane) ……..…..PLANORBID SNAILS
Gastropoda: Planorbidae Generally found in slower waters such as runs
MODERATELY TOLERANT
0.6 cm – 2.7 cm

B. Shell patelliform (cup shaped), limpet-like ……FRESHWATER LIMPETS
Gastropoda: Ancyclidae Found in riffles
MODERATELY TOLERANT
0.4 cm

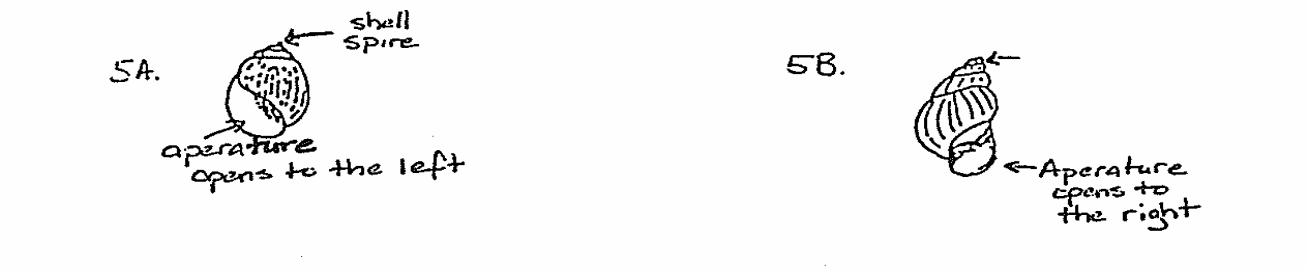
C. Shell with a distinct spiral ……..…5



5(4)A. Shell sinistral (“left-handed”) ……..……..POUCH SNAILS
Gastropoda: Physidae (*Physella*) Often found in slower waters
GENERALLY TOLERANT
1.0 cm – 1.8 cm

B Shell dextral (“right-handed”) ……..……RIVER AND POND SNAILS
Gastropoda: Lymnaeidae.
GENERALLY TOLERANT
0.5 cm – 2.5 cm

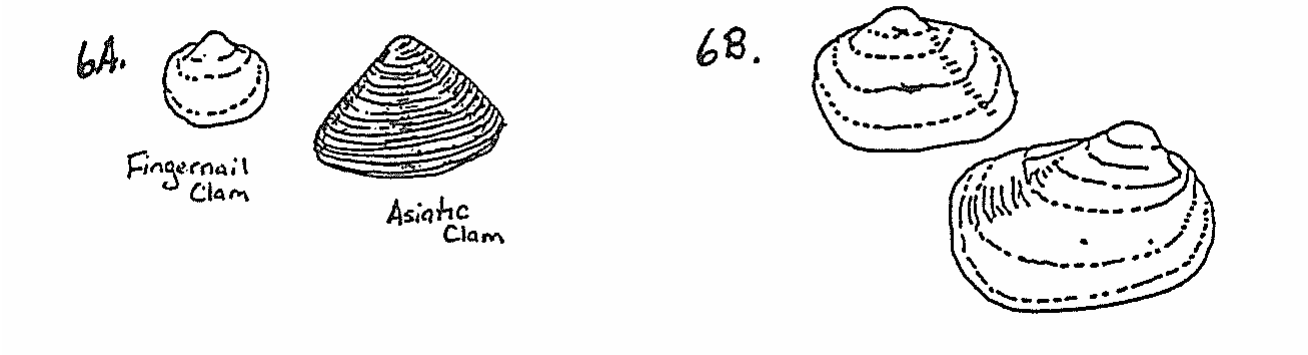
*NOTE: “Handedness” is determined by holding the shell spire up and the aperture facing you. If the aperture is on the right, the snail is “right-handed” or dextral; if the aperture is on the left, the snail is “left-handed” or sinistral*.




6(2)A. Small bivalves, adults < 2 cm long …….……FINGERNAIL & ASIATIC CLAMS
Bivalvia: Sphaeriidae and Corbiculidae Fingernail clams are very small with thin fragile shells. Asiatic clams have larger, thicker shells with obvious growth rings.
FAIRLY INTOLERANT
0.4 cm – 2.0 cm

B. Large bivalves, adults mostly > 2 cm long ……...……CLAMS & MUSSELS
Bivalvia: Unionidae Very young individuals may be less than 2 cm long
2.0 cm – 14.0+ cm

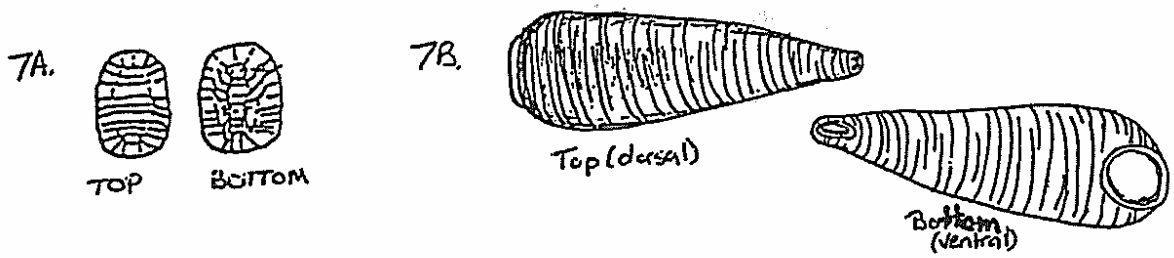
*NOTE: Characteristics used to distinguish different bivalves are internal but most have distinct shells and can be roughly picture keyed*.



7(1)A. Entire body distinctly segmented, flattened and oval in shape; the head, 6 pairs of jointed legs and gills are hidden ventrally (beneath the body); copper or brown in color; cling tightly to rocks ……..……..…….WATER PENNIES
Coleoptera: Psephenidae
INTOLERANT
1.0 cm

B. Body oval or elongate, soft and indistinctly segmented; head, legs and gills lacking; with anterior and posterior ventral (bottom) suckers…….……LEECHES
Hirudinea
MODERATELY TOLERANT
0.5 cm – 4.2 cm

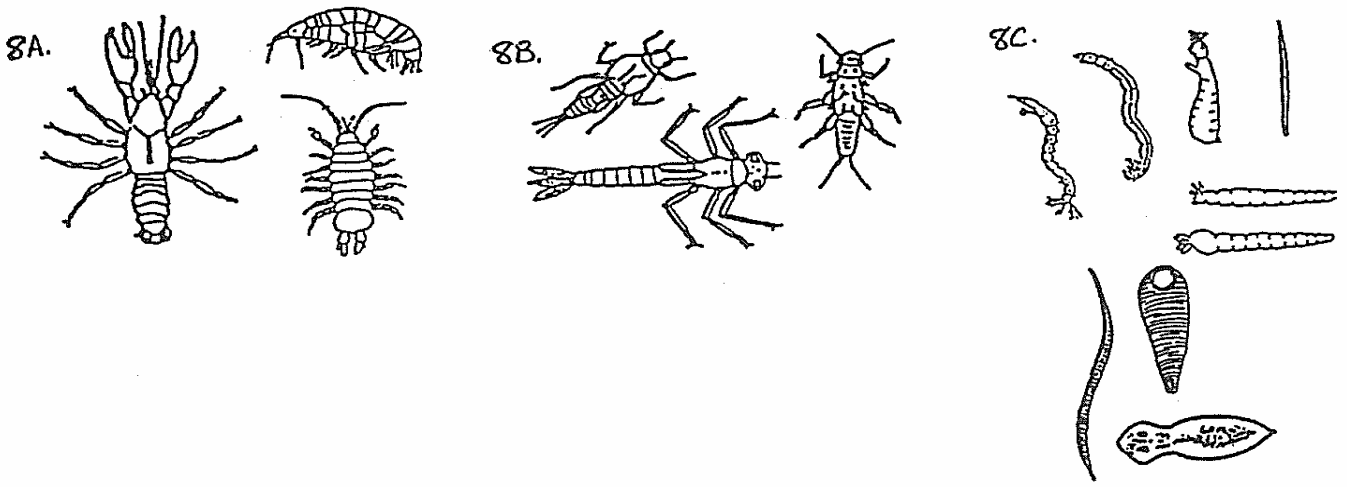
C. Body not a distinctly flattened oval shape; with or without legs; without suckers…… ..8




8(7)A. With more than 6 true, jointed legs. CRAYFISH, SCUDS AND SOWBUGS…….9

B. With 6 true, jointed legs. (Insecta: except Diptera) ……..……..……11

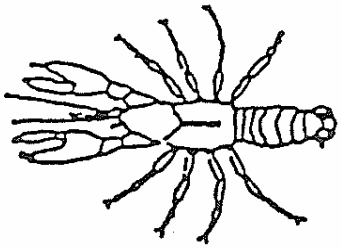
C. With less than 6 true, jointed legs, although non-jointed legs (prolegs) may be present; body often worm-like …….…....31



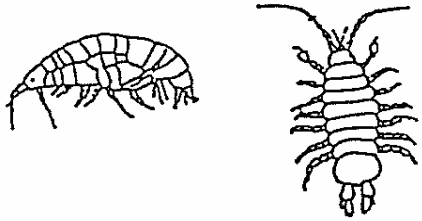
9(8)A. Generally large organisms with 2 large claws (chelipeds), one or both of which may be missing. Small (young) individuals are common in some areas in spring ….CRAYFISH
Crustacea: Decapoda (Cambaridae)
FAIRLY INTOLERANT
1.0 cm – 16.0 cm

B. Smaller organism, lacking large claws ……..….10

9A.



9B.



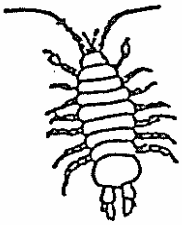
10(9)A. Flattened laterally (from side to side); tan, white or gray in color, ……...SCUDS
Amphipoda
INTOLERANT
0.5 cm – 2.0 cm

B. Flattened dorsoventrally (top to bottom); gray in color …….…….SOWBUGS
Isopoda: Sowbugs resemble the terrestrial "pill bugs" which belong to the same order.

MODERATELY TOLERANT
0.5 cm – 2.0 cm

10A.

10B.

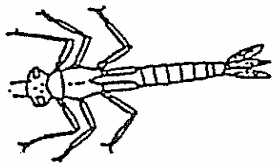


11(8)A. With three broad, oar-like "tails" (gills); body long and thin; wing pads present
DAMSELFLIES ……..……12
Odonata (Zygoptera)

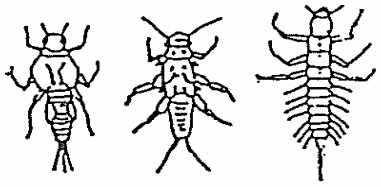
B. With 1, 2, or 3 thin caudal filaments ("tails") ……..……13

C. With no thin caudal filaments; prolegs or other appendages such as spines or hooks (tarsal claws) may be present ……18

11A.



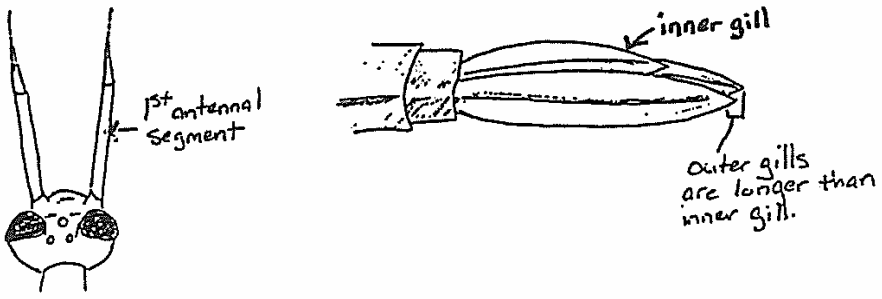
11B.



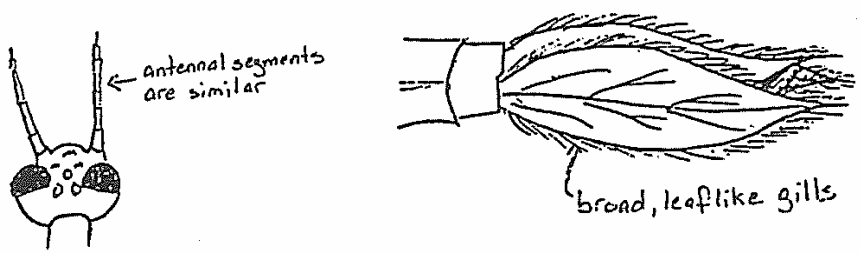
12(11)A. Long, slender body with long legs; first antennal segment is much longer than the other segments; caudal gills are long and slender with the outer gills being longer than the inner gill ……..……BROADWINGED DAMSELFLIES
Odonata (Zygoptera): Calopterygidae
INTOLERANT

B. Body is relatively short; antennae are made of segments of similar size; gills are broad and leaflike, and pointed at tips ……..NARROWWINGED DAMSELFLIES
Odonata (Zygoptera): Coenagrionidae
FAIRLY INTOLERANT
0.8 cm – 3.0 cm

12A.




12B.



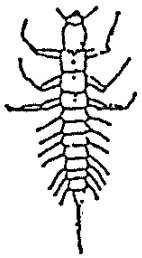
13(11)A. With 1 caudal filament; body brown or copper in color, head and "tail" lighter in color ……...…ALDERFLIES
Megaloptera: Sialidae (*Sialis*)
INTOLERANT
2.0 cm – 2.5 cm

B. With 2 caudal filaments. STONEFLIES and OTHER MAYFLIES ……..…..14

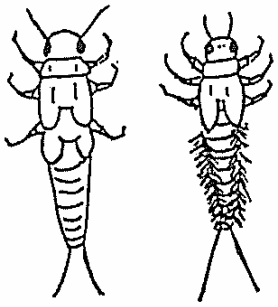
C. With 3 caudal filaments. MAYFLIES ……...……...15

*NOTE: The caudal filaments of mayflies often break off easily; look for "tail stubs." You will need a hand lens to see the tarsal claws*.

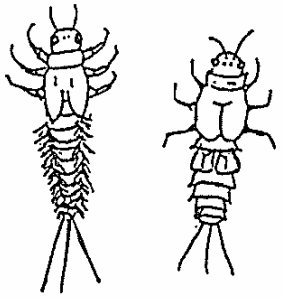
13A.



13B.



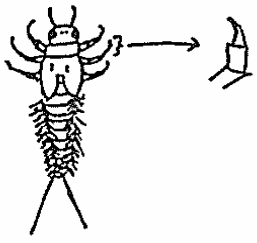
13C.



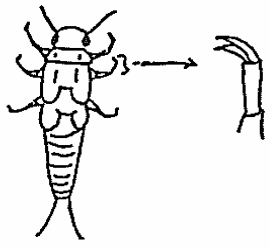
14(13)A. One tarsal claw; gills present on abdominal segments; individuals are generally more flimsy…….……..…OTHER MAYFLIES
Ephemeroptera: Some members of the families Heptageniidae and Baetidae
SOMEWHAT INTOLERANT
0.5 cm – 2.0 cm

B. 2 tarsal claws; gills, if visible, are not located on abdomen; body tan, brown or yellow, sometimes patterned; size varies but most are robust……STONEFLIES
Plecoptera: Several families
INTOLERANT
0.5 cm – 4.5 cm

14A.



14B.



15(13)A. Mandibles modified into tusks (elongated past head); body creamy white, tan or with brown and white pattern; gills forked ……..…..BURROWING MAYFLIES
Ephemeroptera: Ephemeridae, Potamanthidae Found in soft substrates burrowing in sand, mulch, silt, etc.
FAIRLY INTOLERANT.
1.0 cm – 3.3 cm

B. Without tusks ……..……..16

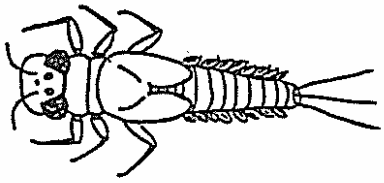
15A.

15B.

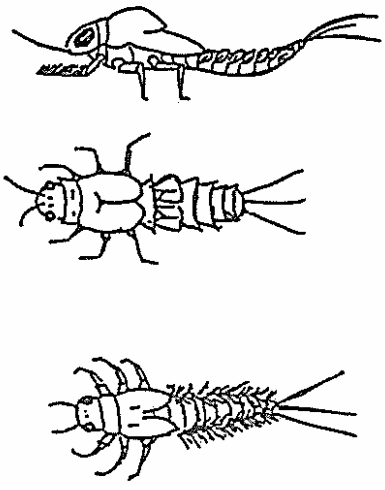
16(15)A. Body flattened dorsoventrally (top to bottom); eyes large and located on top of head ……..CLINGING MAYFLIES
Ephemeroptera: Heptageniidae Tolerance ranges from intolerant to somewhat tolerant; three common genera (*Stenacron, Stenonema and Heptagenia*) are intolerant.
0.5 cm – 2.0 cm

B. Body not flattened dorsoventrally ……..…….17

16A.



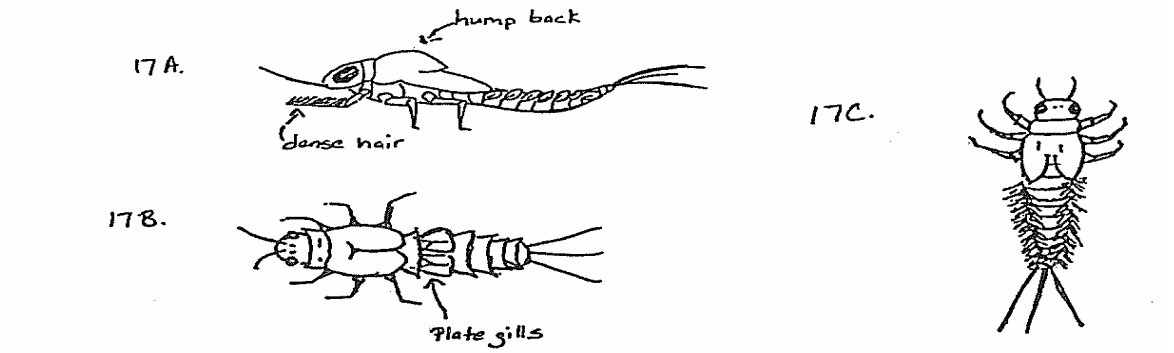
16B.



17(16)A. Body slightly compressed from side to side; thorax slightly humped; torpedo-shaped; front legs with a dense row of hairs …….TORPEDO MAYFLIES
Ephemeroptera: Oligoneuridae One of the swimming mayfly groups
INTOLERANT
1.0 cm – 2.5 cm

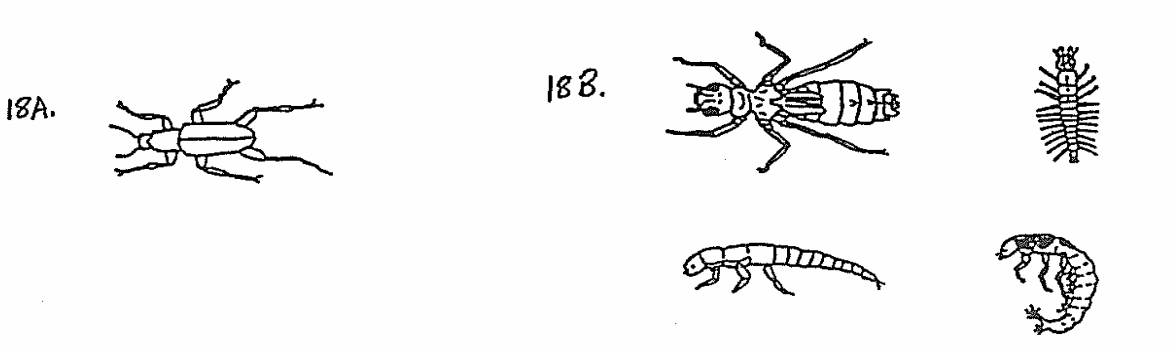
B. Body not compressed from side to side; front legs without a dense row of hairs; gills on abdomen resemble two plates ……CRAWLING MAYFLIES
Ephemeroptera: Caenidae and Tricorythidae
FAIRLY INTOLERANT
0.5 cm – 1.5 cm

C. Body not compressed from side to side; front legs without a dense row of hairs; no plate gills on abdomen ……..…..……SWIMMING MAYFLIES
Ephemeroptera: Baetididae and Siphlonuridae
INTOLERANT
0.5 cm – 1.5 cm



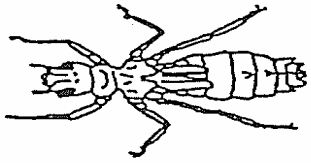

18(11)A. Entire body, including the front wings, is hard; small, dark beetles that are long and thin, or ovoid in shape ……..…….ADULT RIFFLE BEETLES
Coleoptera: Elmidae and Dryopidae
0.5 cm – 2.5 cm

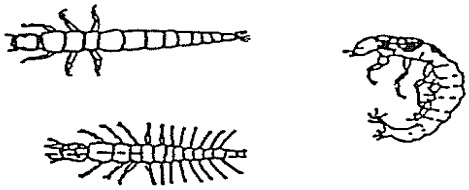
B. Entire body not hard ……..…….19



19(18)A. With external wing pads; lower jaw (labium) large, hinged and folded up on itself concealing other mouthparts ……..…..DRAGONFLIES
Dragonflies are seldom found in riffles, but may be found buried in soft sediments (e.g., sand, silt or mud) or in vegetation and detritus along the stream edge or in slightly slower waters.
Odonata: Anisoptera
FAIRLY INTOLERANT
1.2 cm – 6.0 cm

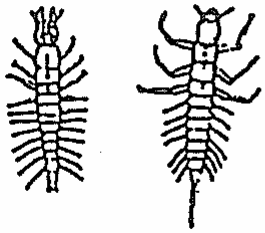
B. Without external wing pads; labium not hinged ……..……20

19A. 

19B. 

20(19)A. Abdomen with lateral appendages ……..…..21

B. Abdomen without lateral appendages (ventral gills may be present) …….…….23

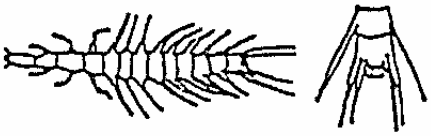
20A. 

20B. 

21(20)A. Lateral appendages long and thick; abdomen terminating in a single slender filament, or in prolegs, each with two terminal hooks; body dark brown to black; most are large, some to 10 cm long……..……..……..22

B. Lateral appendages long and thin, or short and thick; abdomen terminating in 2 slender filaments, or in a median proleg with 4 hooks; body lighter in color, tan, whitish or yellow; mostly smaller (< 2 cm long) ……BEETLE LARVAE
Coleoptera: Gyrinidae (Whirligig Beetles)
INTOLERANT
0.7 cm – 3.5 cm

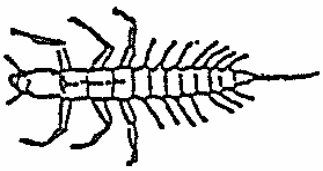
21A. 

21B. 

22(21)A. Abdomen with a single caudal filament ……..….ALDERFLY LARVAE
Megaloptera: Sialidae (*Sialis*)
INTOLERANT
2.0 cm – 2.5 cm

B. Abdomen with hooks on short appendages ……..…….DOBSONFLY LARVAE or HELLGRAMMITES
Megaloptera: Corydalidae One genus (*Corydalus*) has abdominal gill tufts under the lateral appendages.
INTOLERANT
3.0 cm – 8.0 cm

22A.



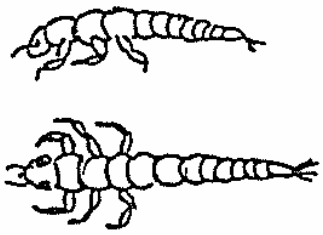
22B.

23(20)A. With hooks at end of abdomen; individuals often curl into a "C" shape when held or preserved; body color variable, but head usually brown or yellow; abdomen whitish, tan or green; pronotum (first dorsal thoracic segment) with a distinctly scleriterized plate; abdomen membranous and of a different color from thoracic plates; many build some sort of portable or stationary case of plant material, sand or pebbles
CADDISFLIES ……..…..25

B. Without hooks at the end of the abdomen; no gill structures on abdomen; 6 true (segmented) legs on thorax and no prolegs on abdomen…….24

23A.

23B.

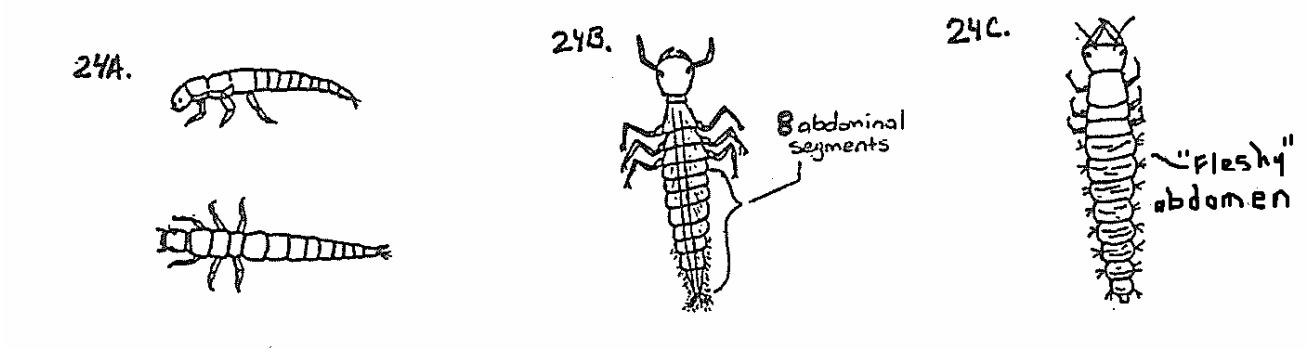


24(23)A. Thorax and abdomen are similar in width giving the organisms a "tube-like" shape; body brown, copper-colored or tan; body somewhat "leathery" in appearance……..RIFFLE BEETLE LARVAE

Coleoptera: Elmidae and Dryopidae Riffle beetle larvae resemble midge larvae and are about the same size but riffle beetle larvae are leathery rather than membranous and have segmented legs (true legs) on the abdomen.
FAIRLY INTOLERANT
1.0 cm – 1.8 cm

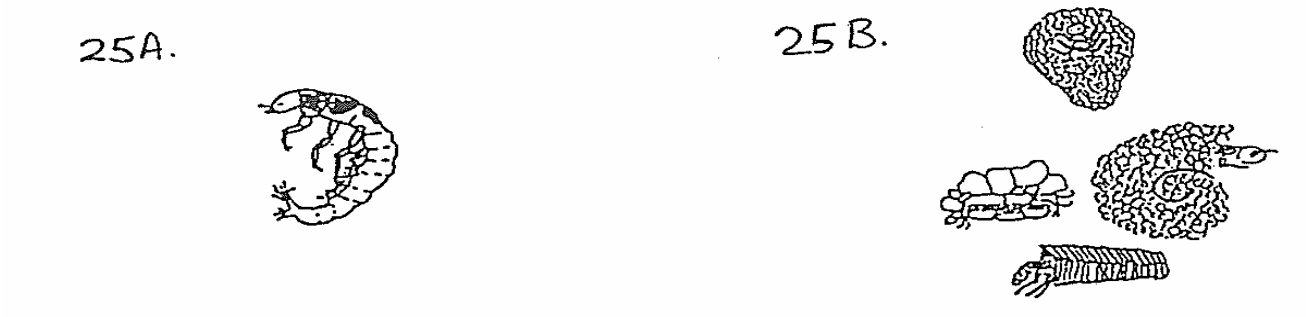
B. Body is "submarine-shaped;" abdomen made up of 8 segments; legs on thorax have 5 segments with two claws……PREDACIOUS WATER BEETLE LARVAE
Coleoptera: Dyticidae
*NOTE: No tolerance value is given for this family, but indicate the number of larvae you collected for trend assessment.*
0.5 cm – 6.5 cm

C. Abdomen is largely membranous and wrinkled, sometimes with long filaments; mandibles are large and well developed; legs on thorax have 4 segments with one claw ……..…WATER SCAVENGER BEETLE LARVAE
Coleoptera: Hydrophilidae.
*NOTE: No tolerance value is given for this family, but indicate the number of larvae you collected for trend assessment.*
0.5 cm – 6.0 cm



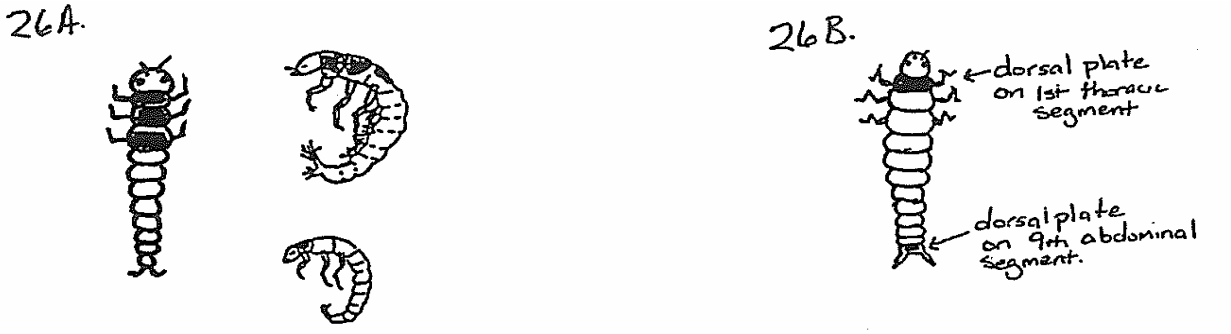

25(23)A. Without a portable case (some build stationary cases made of small rocks and sand) ……...26

B. With a portable case……..28



26(25)A. Head as wide as thorax; dorsal plates found either on the first thoracic segment or on all three thoracic segments; builds stationary cases of stone and sand on rocks……..27

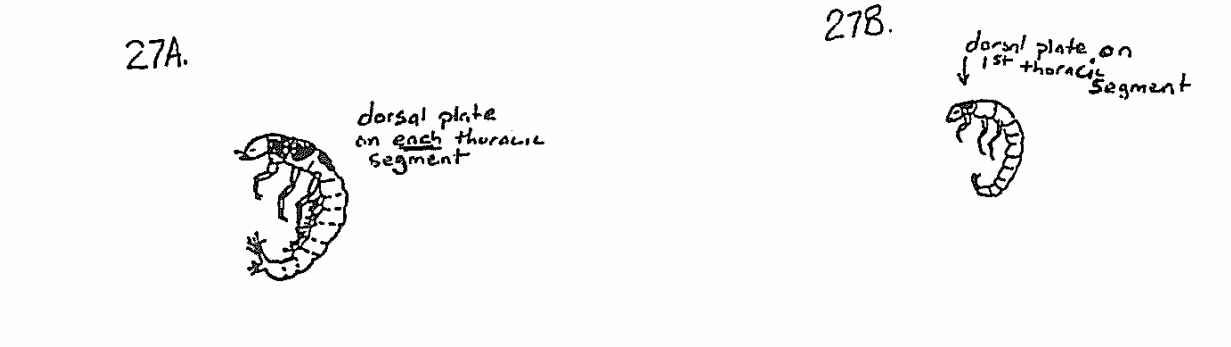
B. Head narrower than thorax; dorsal plates on first thoracic segment, and on last abdominal segment; free-living caddisfly; builds no case ……OTHER CADDISFLIES
Trichoptera: Rhyacophilidae (Free-living caddisflies)
INTOLERANT
1.5 cm – 3.3 cm




27(26)A. Each thoracic segment with a single dorsal plate; abdomen with gills ventrally (on bottom); > 5 mm in length …….HYDROPSYCHIDAE
Trichoptera: Hydropsychidae Net spinning caddisflies
FAIRLY INTOLERANT
0.8 cm – 2.0 cm

*NOTE: Microcaddisflies, which also have 3 dorsal plates on the thorax, resemble Hydropsychids when the former are out of their cases. Microcaddisflies are very small (mostly < 5 mm), lack abdominal gills, and their abdomens are swollen (larger than thorax). They build cases of silk which are sometimes covered with sand or other substrates.*

B. Prothorax with a dorsal plate, mesonotum (second thoracic segment) and metanotum (third thoracic segment) partly or entirely membranous……OTHER CADDISFLIES
Trichoptera: Three families, Psychomyiidae, Philopotamidae and Polycentropodidae (Net-spinning caddisflies)
INTOLERANT
0.8 cm – 2.0 cm



28(25)A. Case of organic detritus (e.g., small sticks, leaves) ……..……29

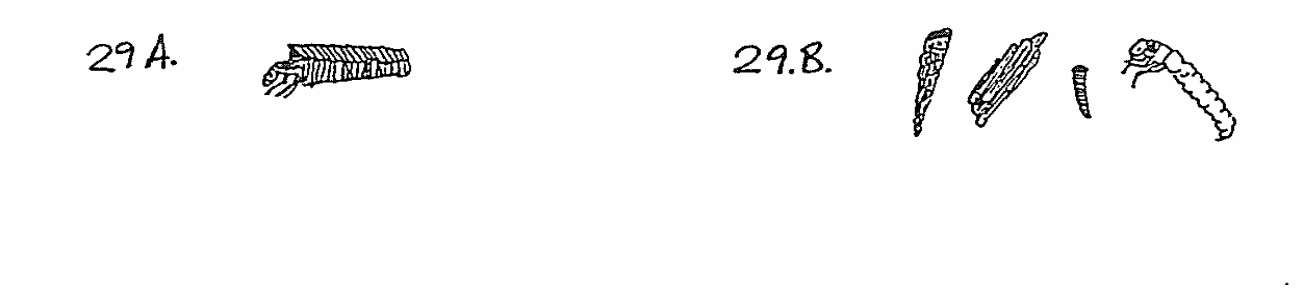
B. Case of sand or small stones ……30

*NOTE: There are two groups of Tube-case Caddisflies, one builds organic tubes and the other mineral tubes.*

C. Case of silk, may be covered with sand or organic material; animal very small (2-5 mm); each thoracic segment with a single dorsal plate; no ventral abdominal gills ……..…OTHER CADDISFLIES
Trichoptera: Hydroptilidae (Purse-case or Microcaddisflies) Resemble the Hydropsychidae but much smaller and without ventral abdominal gills.
INTOLERANT


29(29)A. Case is square in cross section ……..…..……OTHER CADDISFLIES
Trichoptera: Brachycentridae (Brachycentrid Caddisflies)
INTOLERANT
0.8 cm – 1.3 cm

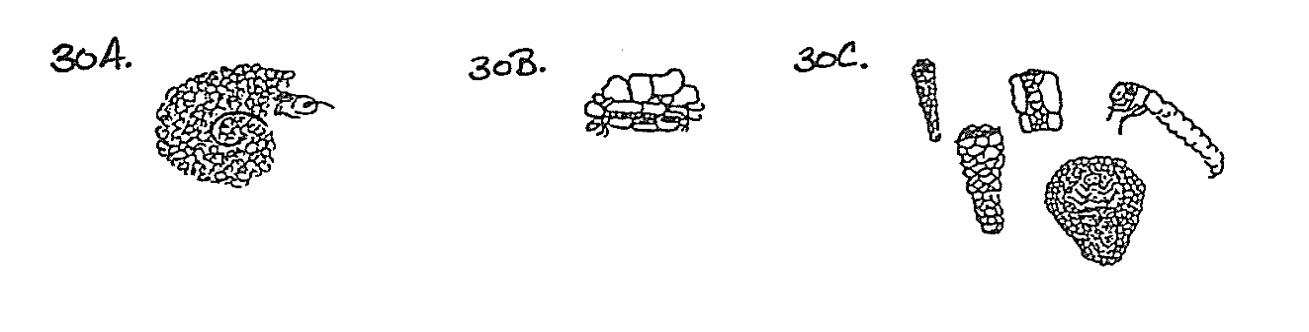
B. Case is cylindrical……OTHER CADDISFLIES
Trichoptera: Leptoceridae, Phryganiidae, Limnephilidae, and Lepidostomatidae (Tube-case Caddisflies)
INTOLERANT
0.8 cm – 4.0 cm



30(28)A. Case shaped like a snail shell and made of sand ……..……OTHER CADDISFLIES
Trichoptera: Helicopsychidae (Snail-case Caddisflies)
INTOLERANT
0.5 cm

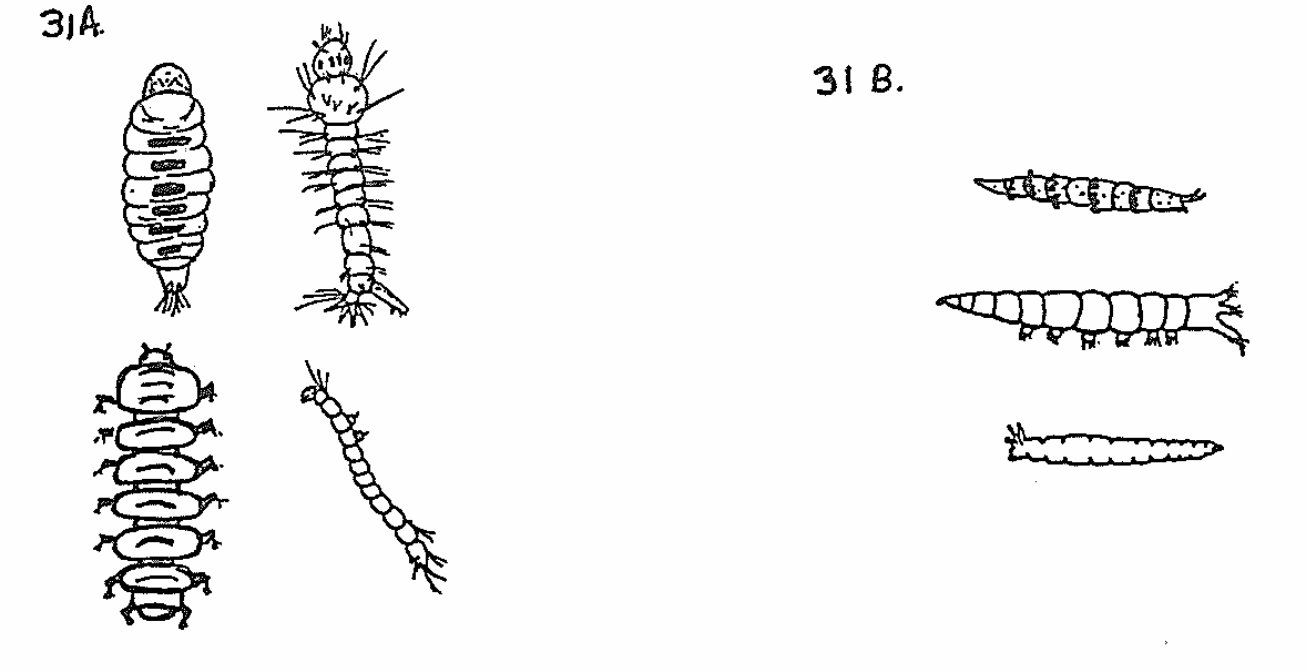
B. Case made of small stones and turtle-shell shaped (top is dome-shaped; underside is flat)……OTHER CADDISFLIES
Trichoptera: Glossosmatidae (Saddle-case Caddisflies)
INTOLERANT
1.0 cm

C. Tube made of sand or stone, and shaped like a tube……OTHER CADDISFLIES
Trichoptera: Three families: Molanidae, Limnephilidae, and Odontoceridae.
INTOLERANT
0.5 – 1.5 cm




31(8)A. Body with a distinct, visible head capsule……..…….32

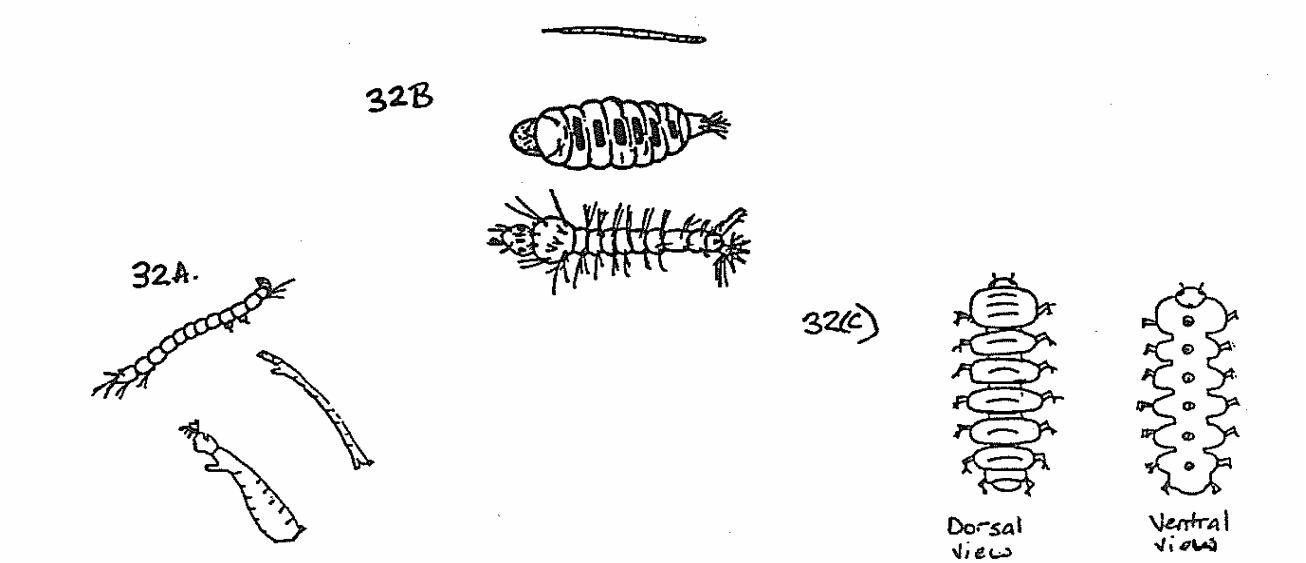
B. Body without a distinct head capsule or head capsule retracted……..36



32(31)A. Body with 1 or 2 pairs of prolegs either of which may appear as a single leg……..……35

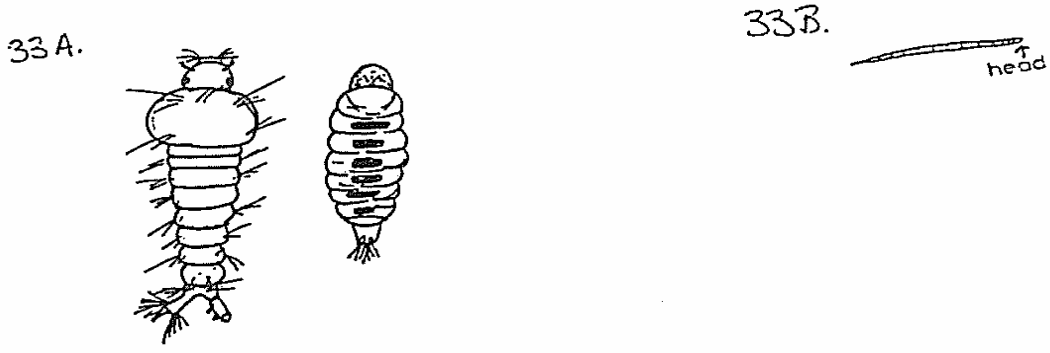
B. Body without prolegs…….……..33

C. Body made up of 6 segments; with a row of "suckers" on the underside (ventral) of the body…….……OTHER FLIES
Diptera: Blephariceridae (Net-winged midges)
0.5 cm – 1.3 cm



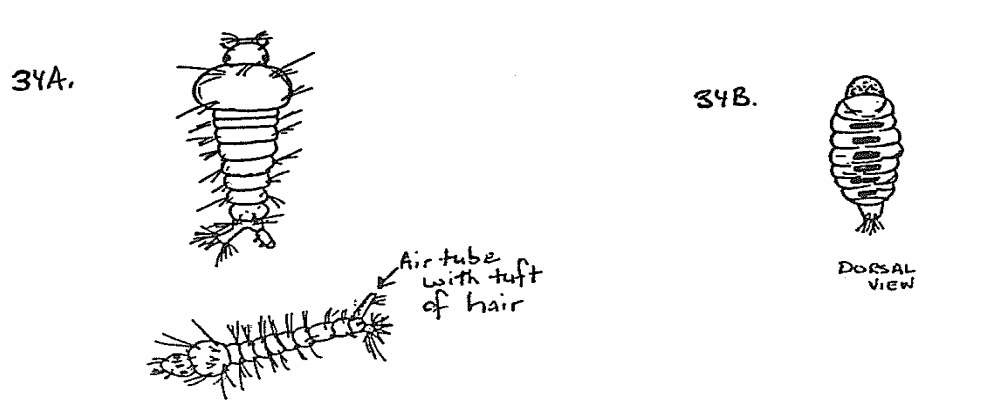

33(32)A. End of abdomen with a breathing tube or a tube-like process ……..…..34

B. No breathing tube or tube-like process found at the end of abdomen. Body is straight and slender…….……..…BITING MIDGES
Diptera: Ceratopogonidae. Also known as "punkies" or "no-see-ums."
FAIRLY INTOLERANT
1.5 cm – 2.8 cm



34(33)A. Body segment behind head (or first thoracic segment) is enlarged. Tip of abdomen with a breathing tube and hair-like bristles……OTHER FLIES
Diptera: Culicidae (Mosquitoes)

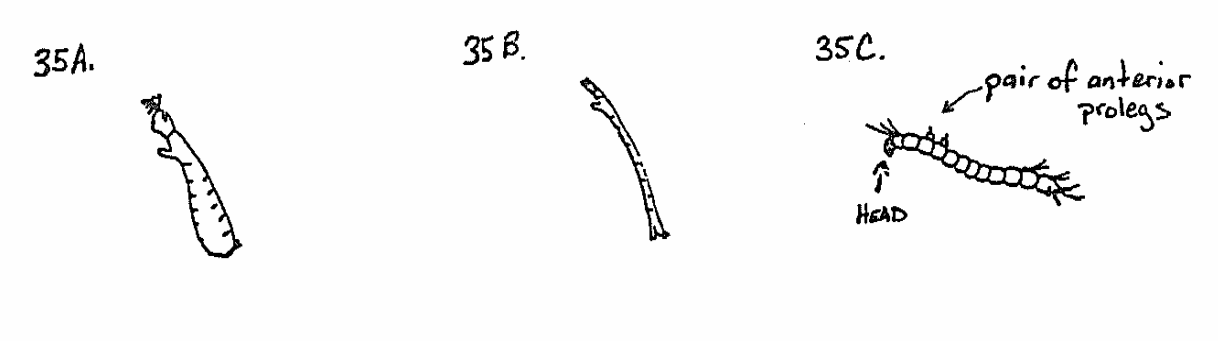
B. Head is completely visible. Tip of abdomen with a large tube and a tuft of hair. Organism is small in size (under 4 mm). Dorsal plates can be found on each segment
…….……OTHER FLIES
Diptera: Psychodidae (Moth Flies)
0.5 cm




35(32)A. With 1 pair of anterior prolegs; abdomen with a distinct bulge posteriorly (abdomen is swollen at end); usually gray or mottled brown in color…….……..BLACK FLIES
Diptera: Simuliidae Usually found in very fast moving water.
MODERATELY TOLERANT
0.5 cm – 1.5 cm

B. With 1 pair anterior (near head) and 1 pair posterior (on abdomen) prolegs; body tubular, width about equal throughout (no posterior bulge); color variable but usually white, green or red …….……..37
Diptera: Chironomidae (True Midges)

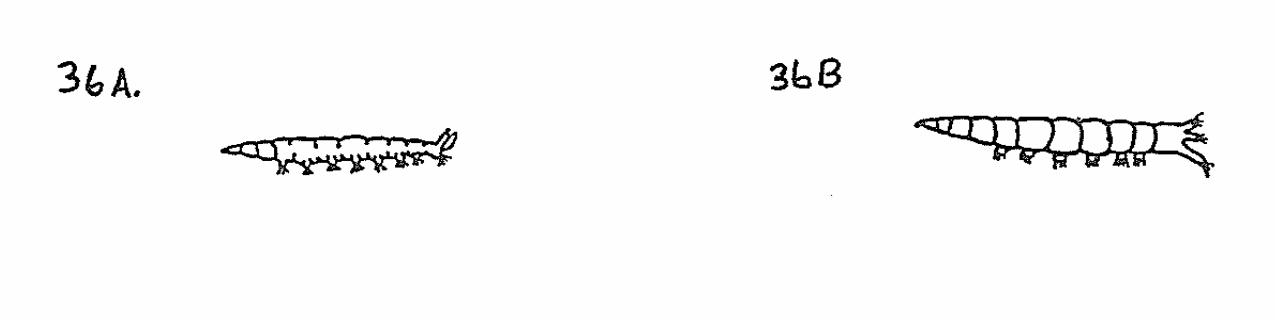
C. With 2 pairs of prolegs on body segments behind head. Tip of abdomen with two hair-fringed lobes and a tube-like process …….……OTHER FLIES
Diptera: Dixidae (Dixid Midges)
0.3 cm – 0.8 cm



36(31)A. Body with tubercles (small thin tubes) on top (dorsal) and sides (lateral) of the body or abdomen. With 8 pairs of abdominal prolegs and a pair of long terminal appendages; head region is long in length …….…….SNIPE FLIES
Diptera: Athericidae (*Atherix*)
FAIRLY INTOLERANT

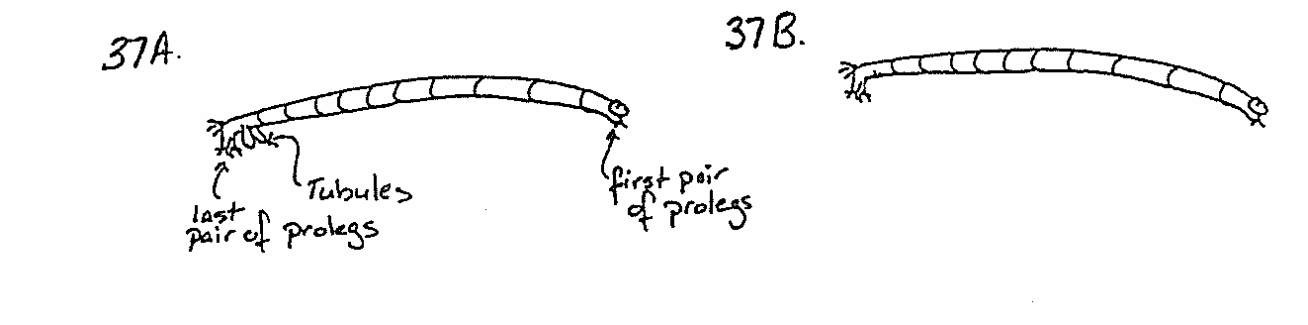
B. Body without dorsal and lateral tubercles; with 8 or less pairs of prolegs; abdomen terminates in 1-4 rounded lobes tipped with short hairs ……....OTHER FLIES
Diptera: Empipidae (Dance Flies)

C. With characteristics other than those listed in A; if prolegs are present, then without a pair of long terminal appendages and head is not long in length; prolegs may be lacking altogether…….….38




37(35)A. Body is red in color (may be clear or tan if organism is preserved); end of abdomen has four tubules positioned before the last pair of prolegs……BLOOD WORMS
Diptera: Chironomidae
TOLERANT

B. Body is white or green in color; end of abdomen does not possess four tubules before last pair of prolegs…….……..…….……MIDGES
Diptera: Other Chironomidae
MODERATELY TOLERANT



38(36)A. Head is small, dark and usually retracted into thorax; usually with 4 to 8 short tubes at one end (posterior, or on the abdomen) arranged in a circular pattern, although some generally have less than 4 tubes; body usually soft and membranous…….……CRANEFLIES
Diptera: Tipulidae
INTOLERANT

B. Head is small and fleshy (not dark) and not retracted into thorax; body appears leathery and yellow or brown and covered with tubercles (or bumps); tip of abdomen has lobes surrounding the spiracular disk at the tip……..……..OTHER FLIES
Diptera: Sciomyzidae (Marsh Flies)

C. Spindle-shaped body; no tubercles on end of abdomen; may have prolegs…….39


39(38)A. Possess prolegs and some type of caudal process which may be a long process extending from tip of abdomen, a fleshy bifurcated tail (split in two) or a tube-like structure……..OTHER FLIES
Diptera: Empididae (Dance Flies), Ephydridae (Shore Flies)
0.3 cm – 0.8 cm

B. Body is spindle-shaped with no type of structure on the tip of the abdomen. A "girdle" of false legs on each segment ……..OTHER FLIES
Diptera: Tabanidae (Deer Flies and Horse Flies)
1.0 cm – 4.5 cm

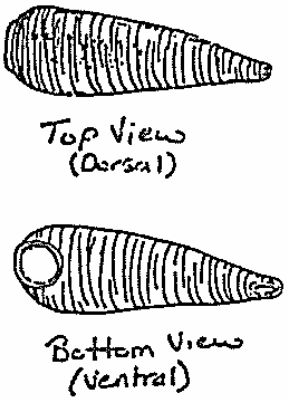
C. Body does not have any characteristics listed above. May possess 2 suckers (one anterior and one posterior). May have eyespots……..……..….40

40(39)A. Body segmented, thin and hairlike, not flattened; resemble earthworms…..AQUATIC WORMS

Annelida: Oligochaeta Better known as aquatic oligochaetes, they are related to the terrestrial earthworms.
TOLERANT
0.2 cm – 3.0 cm

B. Body flattened and indistinctly segmented (segmentation may not be seen); long or oval in shape; with anterior and posterior ventral suckers (suckers may be found on the bottom of the animal; one located at the head and the other at the end of the abdomen)
…….LEECHES
Annelida: Hirudinea
MODERATELY INTOLERANT
0.5 cm – 4.0 cm

C. Body wide, flattened, and not segmented, often gray; visible eye spots…….……FLATWORMS
Platyhelminthes: Turbellaria
MODERATELY TOLERANT
0.5 cm – 2.5 cm




# APPENDIX D
# DATA SHEETS

STREAM NAME _____
COUNTY: _____
DATE: _____

## Habitat Survey Sheet
## Names _____

**Start Time _____ am pm** **End Time _____am pm**
**(STT)** **(ENT)**

*Please circle the correct time period

PRESENT WEATHER (PRW)
_____1. Clear/Sunny
_____2. Overcast
_____3. Showers (intermittent rain)
_____4. Rain (steady rain)
_____5. Storm (heavy rain)

WEATHER IN PAST 48 HOURS (WIP)
_____1. Clear/Sunny
_____2. Overcast
_____3. Showers (intermittent rain)
_____4. Rain (steady rain)
_____5. Storm (heavy rain)

TEMPERATURE
Water _____°F °C (WTF or WTC)
Air _____°F °C (ATF or ATC)

Circle the unit of measurement.

WATER APPEARANCE (WAP)
_____1. Clear
_____2. Milky
_____3. Foamy
_____4. Dark Brown
_____5. Oily Sheen
_____6. Reddish
_____7. Green
_____8. Other _____

WATER ODOR (WOD)
_____1. None
_____2. Sewage
_____3. Chlorine
_____4. Fishy
_____5. Rotten Eggs
_____6. Petroleum
_____7. Other _____

TURBIDITY (TUR)
_____1. Clear
_____2. Slight
_____3. Medium
_____4. Heavy

Algal Growth (ALG) _____% of stream bottom covered

Are there Submerged Aquatic Plants? (SAP) Yes No (Circle)
Types? _____

List the types of the riparian (streamside) vegetation present at your stream site (RSV).

_____

_____

Estimate Canopy Cover (CNC). _____% of stream site shaded.

Bottom Substrate. Record percentage of each of the materials that make up the stream bottom. Note all that are present.
_____ Bedrock (BDK) _____ Cobble (2.5 in. – 10 in.) (CBB) _____ Sand (< 0.1 in.) (SND)
_____ Boulder (> 10 in) (BLD) _____ Gravel (0.1 in – 2.5 in.) (GRV) _____ Silt (SLT)
_____ Other (OBS) _____

EMBEDDEDNESS (EMB) Check the description that best describes the percentage of gravel, cobble, and boulder surface covered by fine sediment or silt.

_____ 1. 0 to 25% _____ 2. 25 – 50% _____ 3. 50 – 75% _____4. 75 – 100%

Stream Discharge Estimate

| Stream width (STW):___ feet (A) | Depth Measurement | Velocity Calculation |
|---|---|---|
| | 1. _____ feet | 10 ft ÷ _____ seconds = _____ ft/sec |
| | 2. _____ feet | 10 ft ÷ _____ seconds = _____ ft/sec |
| | 3. _____ feet | 10 ft ÷ _____ seconds = _____ ft/sec |
| | Average Depth _____ feet (ASC) B | Average Velocity _____ ft/sec (ASV) C |

Discharge (width x depth x velocity) _____ feet x _____ feet x _____ ft/sec = _____ ft³/sec
A B C (SDG)

Watershed Features

Indicate whether the following land uses are dominant (D) or occur in just small areas (x) upstream and surrounding your stream site. If a listed land use is not present, leave blank.

| | | | | | |
|---|---|---|---|---|---|
| | Forest | | Logging | | Golf Course |
| | Grassland | | Ungrazed Fields | | Commercial/Industrial |
| | Scattered Residential | | Urban | | Cropland |
| | Sewage Treatment | | Park | | Mining |
| | Sanitary Landfill | | Livestock Pasture | | Housing Construction |

Upstream Dam? Yes No If Yes, how far upstream is the dam? _____
Wastewater treatment discharge upstream? Yes No If Yes, How far upstream? _____
Any pipes emptying directly into or near your study site? Yes No
Channel Alteration. Has the stream been channelized (straightened) at your study site? Yes No
If Yes, what percentage of your study site has been channelized? _____%

Habitat Survey Notes (include sediment odors, appearance, and/or the presence of silt, watershed features present but not used on this data sheet, and any other information you feel is important or interesting to mention):

**Biological Survey Sheet**

STREAM NAME _____
COUNTY: _____
DATE: _____

Which two habitats did you sample? (Check the two answers that apply.)

1. RIFFLES _____2. LEAF PACKS _____3. SNAG AREAS, ETC. _____ 4. UNDERCUT BANKS _____
5. SEDIMENT _____

MACROINVERTEBRATES OF SPECIAL INTEREST

Indicate whether or not you noticed any of the following organisms at your stream site by circling YES or NO.

| | | |
|---|---|---|
| NATIVE MUSSELS | YES | NO |
| ZEBRA MUSSELS | YES | NO |
| FINGERNAIL CLAMS | YES | NO |
| ASIATIC CLAMS | YES | NO |
| RUSTY CRAYFISH | YES | NO |

SUBSAMPLING PROCEDURE

NOTE: If you collect 100 or less organisms, there is no need to subsample. Simply preserve the whole sample. If you collect more than an estimated 100 organisms, then proceed with subsampling procedures. Use the subsampling grid below to help you.

| | | | |
|---|---|---|---|
| **1** | **2** | **3** | **4** |
| **5** | **6** | **7** | **8** |
| **9** | **10** | **11** | **12** |

A. Total # of Organisms Subsampled: _____

B. # of Squares Selected: _____

C. Organisms per Square (A÷B): _____ organisms/square

D. Organisms in Tray (C x 9 OR C X 12): _____ organisms/tray
(TRY)

**MACROINVERTEBRATE IDENTIFICATION**

| ORGANISM | N | $T_i$ | $T_v$ |
|---|---|---|---|
| Flatworm | | 6.0 | |
| Aquatic Worm | | 10.0 | |
| Leech | | 8.0 | |
| Sowbug | | 6.0 | |
| Scud | | 4.0 | |
| Dragonfly | | 4.5 | |
| Broadwinged Damselfly | | 3.5 | |
| Narrowwinged Damselfly | | 5.5 | |
| Hellgrammite | | 3.5 | |
| Torpedo Mayfly | | 3.0 | |
| Swimming Mayfly | | 4.0 | |
| Clinging Mayfly | | 3.5 | |
| Crawling Mayfly | | 5.5 | |
| Burrowing Mayfly | | 5.0 | |
| Other Mayfly | | 3.0 | |
| Stonefly | | 1.5 | |
| Hydropsychid Caddisfly | | 5.5 | |
| Non-Hydropsychid Caddisfly | | 3.5 | |
| Riffle Beetle | | 5.0 | |
| Whirligig Beetle | | 4.0 | |
| Water Penny Beetle | | 4.0 | |
| Crane Fly | | 4.0 | |
| Biting Midge | | 5.0 | |
| Bloodworm | | 11.0 | |
| Midge | | 6.0 | |
| Black Fly | | 6.0 | |
| Snipe Fly | | 4.0 | |
| Other Fly | | 10.0 | |
| Left-Handed Snail | | 9.0 | |
| Right-Handed Snail | | 7.0 | |
| Planorbid Snail | | 6.5 | |
| Limpet | | 7.0 | |
| Operculate Snail | | 6.0 | |
| TOTALS | | | |
| TAXA = _____ | ΣN | | $\Sigma T_v$ |

**MBI = $\Sigma T_v \div \Sigma N$ =** ☐

< 6.0 = GOOD Water Quality
6.1 – 7.5 = FAIR Water Quality
7.6 – 8.9 = POOR Water Quality
> or = 9.0 = VERY POOR Water Quality

**SAMPLE DENSITY = ΣN =** ☐

**TAXA RICHNESS = ΣTAXA =** ☐

**PERCENT COMPOSITION OF INDICATOR ORGANISMS**

| ORGANISM | N | ÷ | ΣN | X 100 = | %C |
|---|---|---|---|---|---|
| MAYFLIES | | ÷ | | X 100 = | |
| STONEFLIES | | ÷ | | X 100 = | |
| CADDISFLIES | | ÷ | | X 100 = | |
| BLOODWORMS | | ÷ | | X 100 = | |
| AQUATIC WORMS | | ÷ | | X 100 = | |

**SUBTOTAL % = _____**

**% ALL OTHERS (100% - SUBTOTAL %) = _____**

**NOTES:**

**Site Sketch Sheet**

**STREAM NAME** _____
**COUNTY:** _____
**DATE:** _____

**Sketch an aerial view of your 200 foot stream site. Be sure to mark the direction of North and the direction of stream flow. Indicate features such as riffles, runs, pools, ditches, wetlands, dams, riprap, tributaries, landscape features, vegetation, and roads. Also indicate where macroinvertebrates were collected in the stream site. Write notes and observations below the sketch or on back.**

IEPA Log No.: **C-0394-05**
CoE appl. #: **200500160**

Public Notice Beginning Date: **April 5, 2006**
Public Notice Ending Date: **May 8, 2006**

Section 401 of the Federal Water Pollution Control Act
Amendments of 1972

**Section 401 Water Quality Certification to Discharge into Waters of the State**

**Public Notice/Fact Sheet Issued By:**

Illinois Environmental Protection Agency
Bureau of Water
Watershed Management Section
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276
217/782-3362

**Name and Address of Discharger:** Holland & Knight, LLC, One Mid America Plaza, Suite 100, Oakbrook Terrace, IL 60181

**Discharge Location:** Section 16, T40N, R7E of the 3rd P.M. in Kane County within Campton

**Name of Receiving Water:** Unnamed wetland

**Project Description:** Construction of a 3-lot residential development. Construction will impact 0.39-acre of wetland. Mitigation for these impacts will be through the purchase of 1 acre of credits through a wetland mitigation bank and enhancement of 0.93-acre of on-site wetland..

The Illinois Environmental Protection Agency (IEPA) has received an application for a Section 401 water quality certification to discharge into the waters of the state associated with a Section 404 permit application received by the U.S. Army Crops of Engineers. The Public Notice period will begin and end on the dates indicated in the heading of this Public Notice. The last day comments will be received will be on the Public Notice period ending date unless a commenter demonstrating the need for additional time requests an extension to this comment period and the request is granted by the IEPA. Interested persons are invited to submit written comments on the project to the IEPA at the above address. Commenters shall provide their names and addresses along with comments on the certification application. Commenters may include a request for public hearing. The certification and notice number(s) must appear on each comment page.

The attached Fact Sheet provides a description of the project and the antidegradation assessment.

The application, Public Notice/Fact Sheet, comments received, and other documents are available for inspection and may be copied at the IEPA at the address shown above between 9:30 a.m. and 3:30 p.m. Monday through Friday when scheduled by the interested person.

If written comments or requests indicate a significant degree of public interest in the certification application, the IEPA may, at its discretion, hold a public hearing. Public notice will be given 30 days before any public hearing. If a Section 401 water quality certification is issued, response to relevant comments will be provided at the time of the certification. For further information, please call Thaddeus Faught at 217/782-3362.

TJF:0394-05PN.doc

**Fact Sheet for Antidegradation Assessment**
**Holland & Knight, LLC – Unnamed Wetland – Kane County**
**IEPA Log No. C-0394-05**
**COE Log No. 200500160**
**Contact: Alyson Grady; 217/558-2012**
**April 5, 2006**

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The applicant has applied for 401 water quality certification for the proposed impact of 0.39-acre of jurisdictional wetlands located in Lily Lake in Section 16, Township 40 North, Range 7 East, Kane County, Illinois. The proposed project will develop three residential lots totaling approximately 2.4 acres within The Windings of Ferson Creek subdivision. One wetland, approximately 1.32 acres in size is located on portions of the three residential lots. The proposed project will fill 0.39-acre across the three lots to allow development of three home sites. Between the remaining wetland and the rear yards of the homes, a 10-foot functional wetland buffer will be planted with shrubs and herbaceous understory. Additionally, a split-rail fence will be constructed to define the protected wetlands from the rear yards. The project will also construct a depressional storage area on-site north of the remaining wetland. This compensation storage area will be planted with native vegetation and will be managed and monitored. Mitigation for the wetland impacts will include the purchase of 1-acre of wetland mitigation bank credit from an approved wetland mitigation bank and the enhancement of the remaining 0.93-acre of wetland. Enhancement activities will include the removal invasive species.

**Identification and Characterization of the Affected Water Body.**

The wetland has a zero 7Q10 flow and is a General Use water. The wetland is not found on the 2004 Illinois 303(d) List nor is it rated under the Agency's Biological Stream Characterization (BSC) system. The wetland is not listed as a biologically significant water body in the Illinois Natural History Survey publication Biologically Significant Illinois Streams. According to the IDNR WIRT system, no threatened or endangered species are located within the project area. The wetland is a wooded wetland approximately 1.32 acres in size. The wetland is primarily vegetated by silver maple, rice cut grass, and clearweed. The Floristic Quality Index for the wetland was 12.01 and the Coefficient of Conservatism for the wetland was 2.62. This wetland continues off-site to the east and west of the project site.

**Identification of Proposed Pollutant Load Increases or Potential Impacts on Uses.**

The pollutant load increases that would occur from this project include some possible increases in suspended solids during the construction. The increase in suspended solids will be local and temporary. The proposed filling of 0.39-acre of wetland will eliminate the current habitat in the impacted area.

**Fate and Effect of Parameters Proposed for Increased Loading.**

The increase in suspended solids will be local and temporary. Erosion control measures will be utilized to minimize any increase in suspended solids and prevent further impact to the remaining wetlands. A buffer will be established between the residences and the remaining portion of the

wetland. Additionally, naturalized planting will occur within the compensatory storage area on the project. Mitigation for the wetland impacts will be through the purchase of 1 acre of wetland mitigation bank credits from an approved mitigation bank.

**Purpose and Anticipated Benefits of the Proposed Activity.**

This project will construct three residences within an existing, platted subdivision.

**Assessments of Alternatives for Less Increase in Loading or Minimal Environmental Degradation.**

The construction of the proposed project will follow guidelines set forth by the Agency and USACE. Erosion control measures need to be implemented to prevent additional impacts to the remaining wetlands. Initially, project site plans would have impacted all 1.32 acres of the wetland within the three lots. The applicant has reduced the impacts while still placing the houses according to the easements on the lots and setback requirements. The least intrusive alternative would be to not impact the wetland. This is not an acceptable alternative given that this is a useful project and will allow the construction of three residences within an existing, platted subdivision, as well as the preservation of some natural areas.

**Summary Comments of the Illinois Department of Natural Resources, Regional Planning Commissions, Zoning Boards or Other Entities**

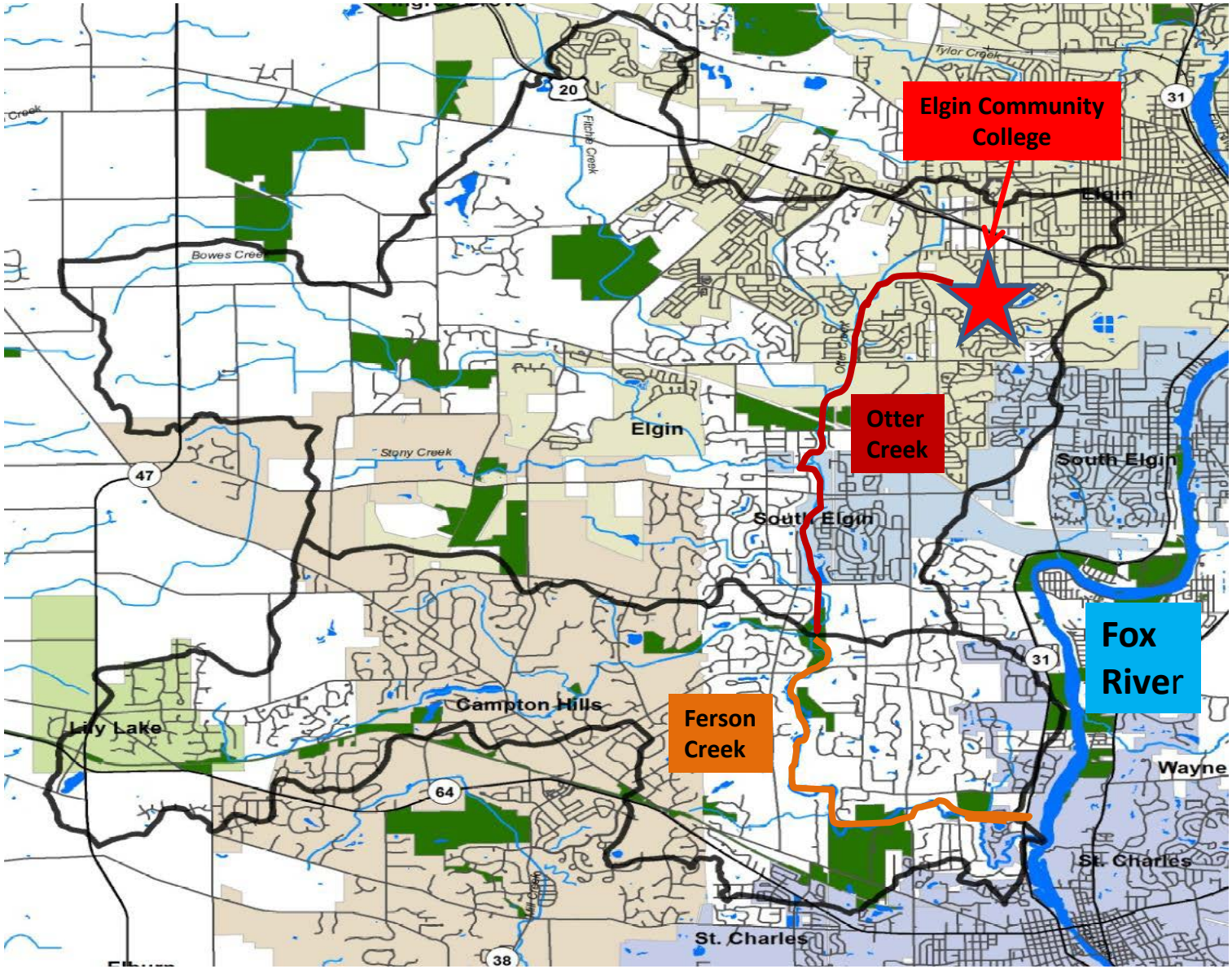
In a letter from Robert Schanzle dated July 28, 2005, IDNR indicated that they have no records of threatened/endangered species or identified natural areas in the vicinity of the project. IDNR also stated that since the anticipated wetland impacts appear to be minor and the wetland is not of notably high quality, IDNR has no objections to the issuance of a DOA permit. IDNR recommends that mitigation for the impacts be at a minimum 1.5:1 ratio and that mitigation occur for any portion of the wetland filled and any portion that would no longer be hydrologically connected to Ferson Creek.

In a letter dated October 10, 2005, Pat Hickey of ENCAP, Inc. on behalf of the applicant indicated that the project site plan had been modified to retain the hydrological connection to Ferson Creek. The project site plan would preserve 0.93-acre of wetland that would remain connected to Ferson Creek and impact 0.39-acre of wetland.

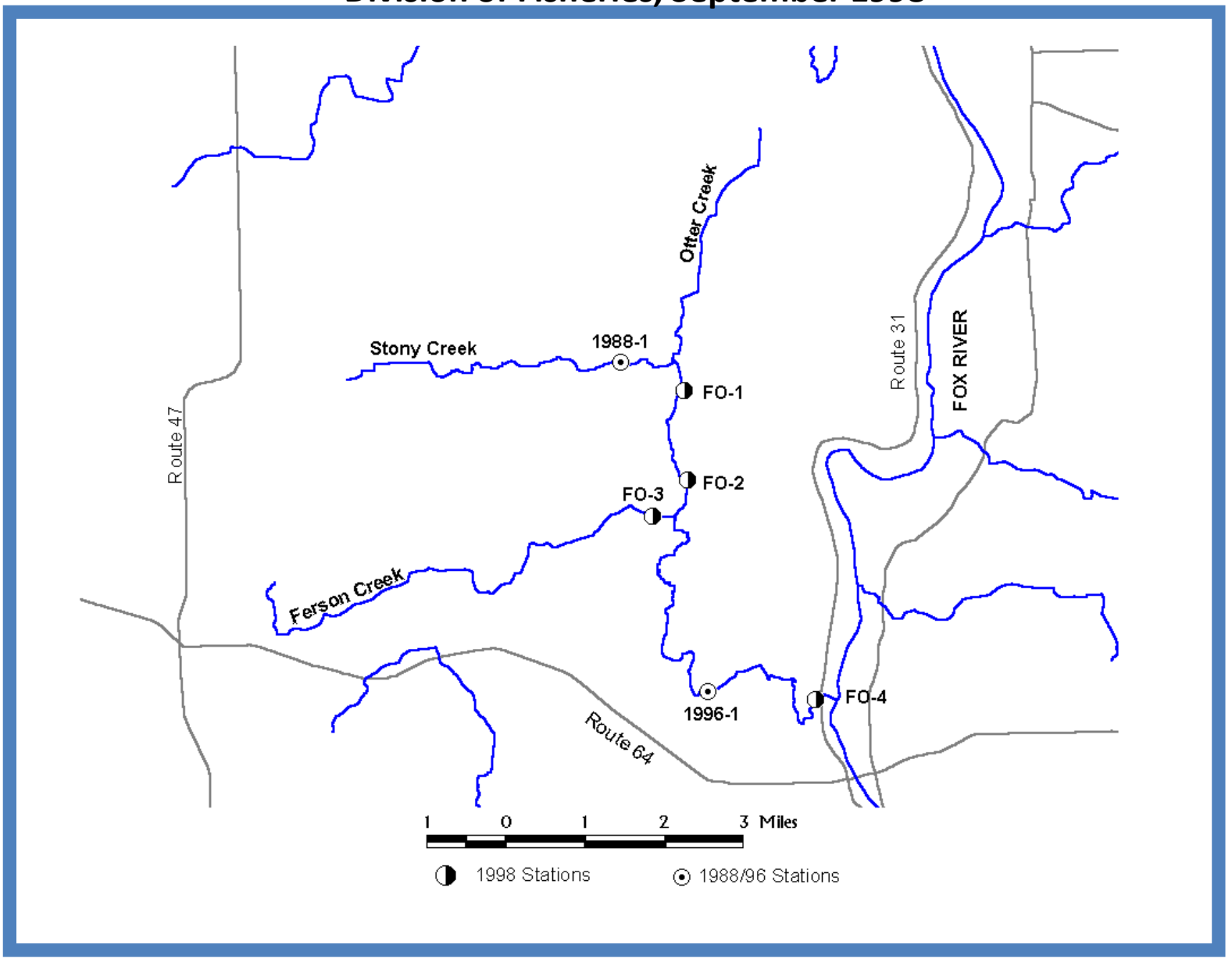
**Agency Conclusion.**

This assessment was conducted pursuant to the Illinois Pollution Control Board regulation for Antidegradation found at 35 Ill. Adm. Code 302.105 (Antidegradation standard). We find that the proposed activity will result in the attainment of water quality standards. All technically and economically reasonable measures to avoid or minimize the extent of the proposed increase in pollutant loading have been incorporated into the proposed activity. This activity will benefit the community at large by providing housing opportunities. The proposed activity is therefore compliant with the Antidegradation standard.

# Otter-Ferson Creek Watershed-Kane County, Illinois



# Ferson/Otter Creek Biological Survey (Sample Locations)
# Illinois Drpartment of Natural Resources
# Division of Fisheries, September 1998



| Sampling Station/Location* | FO-1 | FO-2 | FO-3 | FO-4 | Total |
|---|---|---|---|---|---|
| No. of Fish | 168 | 62 | 256 | 230 | 716 |
| # species | 14 | 14 | 17 | 25 | 31 |
| # intol spp | 1 | 2 | 5 | 10 | |
| IBI | 40 | 36 | 50 | 50 | |
| BSC | C | C | B | B | |
| MBI | 5.0 | 5.2 | 5.2 | 5.3 | |
| SHAP | 53 | 130 | 108 | 166 | |

**FO-1- Otter Creek south (downstream) of McDonald Road.**
**FO-2- Otter Creek at Bend Park, Downstream from Silver Glen Road.**
**FO-3- Ferson Creek upstream (west) of Otter Creek.**
**FO-4- Ferson Creek upstream (North) of Fox River.**

| *COMMON NAME* | *FO-1* | *FO-2* | *FO-3* | *FO-4* | *Total* |
|---|---|---|---|---|---|
| Carp | 5 | 0 | 1 | 0 | 6 |
| Creek chub | 5 | 6 | 37 | 0 | 48 |
| Hornyhead chub | 0 | 3 | 21 | 3 | 27 |
| Central stoneroller | 25 | 7 | 40 | 8 | 70 |
| Striped shiner | 2 | 1 | 1 | 0 | 4 |
| Common shiner | 1 | 4 | 1 | 0 | 6 |
| Spotfin shiner | 0 | 0 | 0 | 3 | 3 |
| Fathead minnow | 2 | 1 | 0 | 0 | 3 |
| Bluntnose minnow | 11 | 10 | 18 | 40 | 79 |
| Emerald shiner | 0 | 0 | 0 | 1 | 1 |
| Rosyface shiner | 0 | 0 | 0 | 2 | 2 |
| Sand shiner | 0 | 12 | 0 | 3 | 15 |
| White sucker | 89 | 10 | 29 | 15 | 143 |
| Northern hog sucker | 0 | 1 | 1 | 16 | 18 |
| Golden redhorse | 1 | 0 | 0 | 1 | 2 |
| Channel catfish | 0 | 0 | 0 | 1 | 1 |
| Stonecat | 0 | 1 | 6 | 19 | 26 |
| Tadpole madtom | 0 | 0 | 0 | 2 | 2 |
| Mottled sculpin | 0 | 0 | 0 | 19 | 19 |
| Largemouth bass | 4 | 0 | 9 | 7 | 20 |
| Smallmouth bass | 0 | 0 | 0 | 4 | 4 |
| Green sunfish | 27 | 3 | 45 | 4 | 79 |
| Bluegill | 12 | 1 | 33 | 23 | 69 |
| Walleye | 0 | 0 | 0 | 1 | 1 |
| Blackside darter | 0 | 0 | 0 | 2 | 2 |
| Slenderhead darter | 0 | 0 | 0 | 9 | 9 |
| Logperch | 0 | 0 | 0 | 8 | 8 |
| Johnny darter | 3 | 2 | 3 | 9 | 17 |
| Banded darter | 0 | 0 | 5 | 14 | 19 |
| Rainbow darter | 0 | 0 | 1 | 0 | 1 |
| Fantail darter | 1 | 0 | 5 | 6 | 12 |

# ATTENTION ANGLERS!

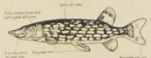
## FISHING REGULATIONS
## FOR THE SPECIAL MANAGEMENT ZONE ON THE FOX RIVER AND TRIBUTARY STREAMS FROM THE SOUTH ELGIN DAM TO THE NORTH AURORA DAM

LARGEMOUTH BASS

SMALLMOUTH BASS

WALLEYE

NORTHERN PIKE



SAUGER



**DAILY CREEL & SIZE LIMITS:**

| | CREEL LIMIT | MINIMUM SIZE |
|---|---|---|
| LARGEMOUTH OR SMALLMOUTH BASS | Catch and Release Only Fishing NO HARVEST PERMITTED | |
| WALLEYE, SAUGER, AND HYBRID WALLEYE | 6** | 18" |
| NORTHERN PIKE | 3 | 24" |

** WALLEYE / SAUGER / HYBRID WALLEYE 6 FISH DAILY CREEL LIMIT EITHER SINGLY OR IN THE AGGREGATE.

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

PLEASE PRACTICE CATCH AND RELEASE FISHING.
THE FUTURE OF FISHING DEPENDS ON YOU!

THANK YOU FOR YOUR COOPERATION.